QST

amateur radio

The RADIO AMATEUR'S HANDBOOK

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American Radio Relay League

West Hartford Connecticut, U. S. A

• EDITORIAL •

AS WE have several times before observed, we amateurs ought to do something to bring about a more extensive occupancy of our lowest-frequency band, the region from 1715 to 2000 kc. The best way to occupy this band is for more of us to move into it. That we urge. We are pleased to see a considerable increase in the number of stations now in this area, following our recent dwellings upon its merits, but it isn't yet enough. Ninety per cent of the new stations in this region, we would guess, are 'phones. There they are finding new freedom, plenty of room, and excellent results despite the fact that summer static makes itself most felt in that of all our bands. If the 'phones can achieve this splendid success in this band, how much easier it will be for c.w. stations to do the same. Excellent communication over moderate distances is to be afforded by these frequencies, we again point out, with average DX increasing annually for some years to come and, for some years at least, with room to burn. Here is surcease from the QRM of 3500–4000, for those who will accept it.

We would urge that c.w. stations moving into this band place themselves in the lower-frequency half, from 1715 to 1875 kc. This accords with our Board's 'phone plan, reported in our July issue, and is furthermore logical because that end of the band is closest to the broadcasting band, where 'phones would have greater likelihood of creating interference to listeners. There is another sound reason, in the interests of us all, for having a good substantial occupancy of this low-frequency end by c.w. stations engaging in worth-while work. Undoubtedly, at Madrid, one of the most vigorous demands will be for an expansion of the broadcast band. This country is not at all likely to support such a move but many European countries want it and it may come to pass. With any expansion upwards in frequency, congestion occurs at our low frequencies and it will be necessary for us to show occupancy if we are to prove our need for these frequencies. The number of amateurs is constantly increasing; if we properly control our use of our different bands, if we will use them intelligently for the purposes to which each is best suited, we are more than enough to occupy this band rather solidly, and at the same time we will effect a vast improvement in our communicating ability in the 3500–4000 band by removing much of the "short-haul" contacts from that region.

GLANCING a moment at the other end of our spectrum, the ultra-high-frequency end, there is increasing evidence of commercial and government interest and occupancy. The Army Air Corps has some very successful aircraft transmitters working in the region from 4½ to 7 meters; the broadcasting people have "5-meter" portable 'phone stations for reporting outdoor events; by winter there will be relatively high-powered experimental television transmissions in the vicinity of 70 megacycles. What is good for these people is good for us too. It is doubtful whether there is enough amateur occupancy of our ultra-high-frequency bands to make a good showing if we were attacked. Of course there is still plenty of room thereabouts and we are in no danger of being attacked. But the commercial occupancy is on the way and we ourselves must be firmly entrenched in our holdings by the time congestion commences. Naturally we don't expect a large flock of amateurs to migrate immediately to 30 mc. and 60 mc. just to prove occupancy. Experimental work with these frequencies is its own reward. These waves have many delightful peculiarities of their own, the work is highly interesting, the communication

generally splendid. *QST* has endeavored to be of eminently practical help by presenting its various "10-meter" articles and particularly its recent material on "5-meter" 'phone. There is no doubt that these bands have the highest future usefulness, once we get the hang of taming them.

SPEAKING of high-frequency 'phone, the lads on 14-mc. voice have certainly been stepping out this summer. Many an astounding QSO has been made by low-powered amateur 'phone. Twenty-meter voice isn't common enough yet for many of the contacts to have had 'phone on both ends, but that will come. The other night we heard a very British voice from Peru, calling CQ on 14-mc. 'phone, and acknowledging American replies three or four at a clip. Autumn here should be one of the best seasons for antipodal DX, and we look to see some records broken.

WHAT this radio world really needs, of course, is a nice billion-dollar invention that somehow enables one to control the working range of any particular frequency. Suppose, for instance, we had some sort of controllable polarization which would permit us to put any desired degree of "english" or spit-ball effect on our wave, thus controlling its rate of return from the upper atmosphere and its skip distance. We don't care how it is accomplished so long as it involves a highly-polished brass hand-wheel turning a pointer around a distance scale, the whole gadget introduced as an auxiliary between the tank tuning and the antenna. (In all our dreams this invaluable device has always had a shiny brass hand-wheel, and we just won't be happy unless it does.) What marvels then await! One frequency for each station, for any distance, any hour, any season. Gone will be congestion, channel-grabbing, international disputes — and amateur-baiting. There will be enough to go around, and more. To all bright youths looking for sudden fame and fortune, we earnestly commend the idea. We will promise to print the name of the inventor in *QST* in letters six inches high (which will take care of the fame part of it), and if the world doesn't go broke this winter the gimmick will be worth any price he cares to ask for it.

K. B. W.

Who's Who in This Issue

James Millen, who tells the inside story of the new amateur-band receiver incorporating features novel and peculiarly adapted to ham station use, started his active amateur career back in 1921 pounding brass in the environs of Broadway and 42nd St., otherwise known as New York City, under the call 2BYP. This continued until 1925 when he went to the succor of BCL's and became the official purveyor of "blue-prints" and a concocter of new circuits on the editorial staff of our one-time contemporary Radio Broadcast. *The following year found Jim deserting the Manhattan area and moving to the more classic environment of Boston, where he attached himself to the National Co., at Malden, and where he has since resumed his amateur activity by putting W1AXL on the air. His technical background includes the degree of Mechanical Engineering from Stevens Institute of Technology, and occasional consulting connections with tube and resistor manufacturers who found need for a good mechanical engineer on their radio problems.*

John Dyer, whose article on practical electron oscillators does much to make the Barkhausen business a lot less mysterious, is at present in active charge of W1CCZ, of which we had something to say last month and which we still think to be the finest ham station yet to come under our eye. John's home station, W1BJD, is at Haverhill, Mass. His intimacy with the ultra-high frequencies and electron oscillations, in particular, is more than casual since work in this field served as the basis of his thesis for graduation from Massachusetts Institute of Technology, which event occurred at the windup of the past academic year. He participated actively in the 56-mc. development work sponsored by QST's *technical staff during the present summer, as related in Ross Hull's article in August* QST.

L. S. Fox, *describes a new type of primary battery especially designed for use with receivers using two-volt tubes, and points out how not to use it, too. Br'er Fox spends his working hours in the Sales Engineering Department of the National Carbon Co. in New York, and after hours pounds brass at W2AHB in Queen's Village.*

Paul S. Hendricks, *whose past was revealed last month, concludes his article describing the standard frequency transmitter at W1XP with details of the 500-watt amplifier.*

K. B. Warner, *A.R.R.L. Secretary, reports on happenings at the C.C.I.R. meeting at Copenhagen. Other contributions from headquarters personnel give pertinent dope on what to do when news breaks and what the Frequency Measuring Test is all about. All in all, there's plenty of meat in this month's pages.*

A Combination A.C. and D.C. Amateur-Band Receiver

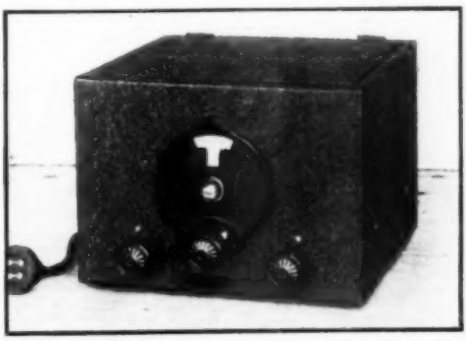
By James Millen, W1AXL*

THE advent of the 1931 crop of new tubes served to open up wider horizons in high-frequency receiver design than the tube and b.c. set manufacturers' advertisements would lead one to believe. The characteristics of several of the new types of tubes are such as to satisfy very nicely some of the requirements peculiar to amateur-band frequencies that were not so well taken care of by the tubes available in the past. Specifically, in the realm of a.c. type detectors, the new Type '35 variable-mu provides a real solution of the regeneration control problem when using grid-leak detection; while the heater type '36 and '37 tubes wipe out the microphonic and other troubles that beset the d.c. receiver previously restricted to using the notoriously noisy '22's and '01-As. Still better, the coming of these d.c. heater type tubes, with their UY bases, has made possible the design of a single receiver that can be used optionally as an a.c. or d.c. set without making a major change in its internal connections. Where the appropriate heater type tubes are employed alternatively for either a.c. or battery operation, the same self-biasing resistors, by-pass condenser arrangement and other such circuit details, that generally vary so widely in the two types of receivers, become identical.

Although little over a year ago a.c. operation of an amateur-band receiver was generally considered rather impractical by the amateur fraternity, the readily recognized superiority of a.c. tubes over the battery type resulted in such an accelerated development of the a.c. receiver that it was not long before the problems of a.c. operation were rather well mastered and the use of a.c. operated receivers became pretty well recognized as standard practice.[1]

In recent months, however, an increasing number of experienced operators has been switching to the use of combination a.c. and battery operated receivers. It is well known that unless an unusually high quality power pack is employed for the completely a.c. operated high-frequency receiver, it is generally found that the combination of a.c. filament heating and battery plate supply results in a steadier reception when receiving weak c.w. signals with an oscillating detector. Possibly this may be due to the isolation of the two sources of power supply, or perhaps merely to the elimination of fluctuations in the plate supply voltage caused by minor variations in the line voltage. Regardless of the exact reason, it must be admitted that battery plate supply is an improvement under some receiving conditions.

The life of the "B" batteries will be long, with the usual few milliamperes drain demanded by a three-tube set, and the first cost of the filament transformer and 135-volt block of batteries will be considerably lower than that of a high grade "r.a.c." supply designed for satisfactory high-frequency receiver work. There is also another advantage to the use of "B"-battery plate supply; and that is the complete elimination of that slight trace of regeneration-control "detuning effect" generally encountered to at least some degree in all completely a.c. operated ham receivers. Probably it is the superior "regulation" characteristic of "B" batteries that overcomes the trouble but, in any event, the combination a.c. filament supply "B"-battery plate supply type of operation seems to be as free from such trouble as when the receiver is entirely battery operated.



SINGLE-CONTROL TUNING OF TWO TUNED CIRCUITS

Band spreading, calibrated volume control, complete shielding and adaptability to either a.c. or battery operation are the salient features of this receiver. The "set and forget" antenna trimmer control is at the left and the regeneration control at the right, with the operating edge of the calibrated volume control disc immediately below the main tuning dial.

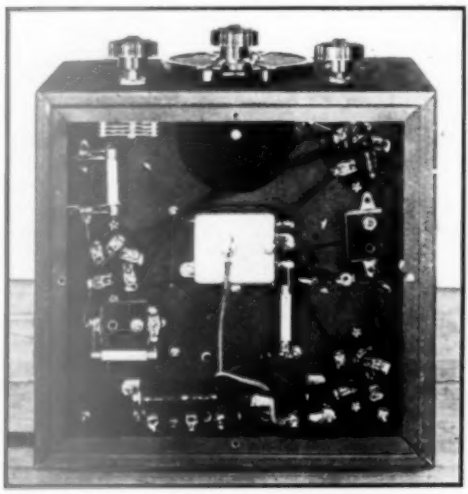
For complete battery operation the new 6-volt d.c. heater type tubes are far superior to any others previously available for such work. Gone are all the noises, microphonics, and other such troubles of former battery tubes. Also, the heater being designed for 6-volt operation restores to use the storage battery or "A" eliminator generally to be found in every amateur station.

In the case of the 3-tube receiver described

* The National Co., Malden, Mass.

[1] Kruse, "Revising Amateur Tuner Design," *QST*, January, 1931.

herewith, the total current consumption at six volts is under one ampere. Unfortunately, however, at this writing a variable-mu screen grid battery tube has not as yet made its appearance, but no doubt when the advantages of the Type



THE UNDERSIDE OF THE A.C. MODEL WITH ITS BASE-PLATE REMOVED

'35 become more generally realized, a companion battery tube will also make its appearance.

Of course there is always a demand for a d.c. receiver from those who must operate in localities where there is no a.c. available, and now with the new heater-type battery tubes it is possible to design a battery receiver of similar characteristics to the a.c. models. Thus the amateur in the rural districts, as well as those on exploration parties, expeditions, etc., may have essentially the same type of set as their brother operators located in the a.c. districts.

GENERAL DESIGN OF THE RECEIVER

The peculiarities of amateur reception, both c.w. and 'phone, seem to be such as to make headsets preferable to loud speakers. For this reason there is little point in equipping the typical ham receiver with a power output stage; a single stage of a.f. amplification is ample. Such is particularly true when the detector is of the screen-grid type and preceded by an r.f. stage that actually has some gain.

As has been discussed in detail in the article previously referred to, the screen-grid type of tube, combined with certain design essentials, has made possible an r.f. stage that actually has real gain all the way up to 50 megacycles, and perhaps higher. The new '35 variable-mu tube, with its lower plate impedance, makes possible the further increase in gain from the r.f. stage of the a.c. set,[2] and the similarly low plate impedance of the Type '36 screen-grid tube gives a corresponding advantage for the d.c. receiver.

While the combination of a single high-frequency stage and a regenerative screen-grid detector is not so selective as a double-detection or superheterodyne arrangement, it is equally as sensitive as any such receiver and has a very definitely better "signal to noise" ratio. This one feature alone should justify the one r.f. stage and screen-grid detector combination, in preference to a number of more elaborate circuits with their marked shortcomings in this respect.

Aside from the value of the gain obtained from the single audio stage, it serves as a very essential coupling medium between the output of the detector and the headphones, so as to insure smooth regeneration, freedom from fringe howl and back-

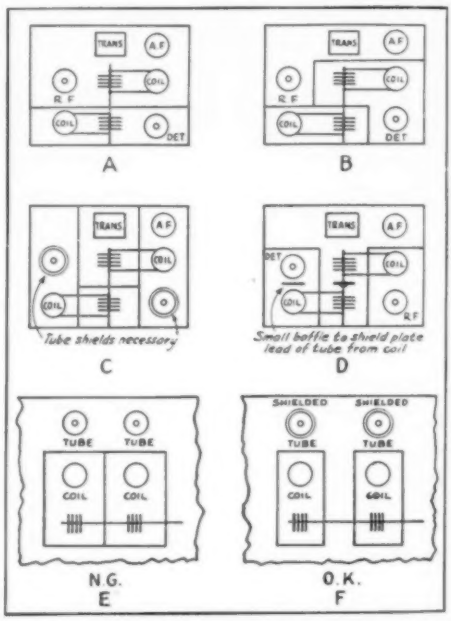


FIG. 1—SHIELDING ARRANGEMENTS, GOOD AND BAD

That shown at D is used in the receiver described.

lash, as well as the elimination of undesired feedback from the 'phone cord to the input circuit of the receiver. Then again, the audio stage makes possible the calibrated attenuation control of which more will be said later.

SHIELDING

While it would seem that the single stage of r.f. and regenerative detector type of circuit is about as simple an arrangement to build as can be imagined, such has been found far from true where just more than mediocre performance is

[2] Grammer, "The Variable-Mu Tetrode," *QST*, May, 1931.

demanded. Take, for instance, the shielding; if it is not serving its purpose, the r.f. tube will oscillate whenever the detector regeneration control is advanced. This condition exists to a surprising extent in both homemade and commercial receivers in use to-day. Such receivers are tolerated, it would seem, simply because the owners have never operated a properly functioning receiver employing the same circuit *properly shielded*. There just isn't any comparison.

The mere fact that the r.f. stage is apparently stable when the detector is approaching an oscillating condition is not necessarily an indication of perfect shielding, as "interlocking" still may be present to a most obnoxious degree. There is, moreover, far more to shielding than the mere boxing off of the different parts of the circuit. Take, for example, the receiver being described. If you were starting to design such a job, wouldn't you try an arrangement as shown in Fig. 1A? At least, that is what we did, and the results were most disappointing. At first thought, this seemed an ideal arrangement because the coils, tubes and condensers of the two circuits were completely shielded from each other. It was found that with a "watertight" joint between the shield and the base there was no oscillation trouble with the r.f. amplifier, although there was an annoying amount of tuning interlocking. As soon as the chassis was put in a metal cabinet, however, and the cover closed, the r.f. stage oscillated violently!

Next tried was the arrangement shown at *B* in Fig. 1, but here the results were not even so satisfactory as the previous arrangement. Furthermore, the lack of symmetry of the shielding made it very difficult to gang the r.f. and detector tuning condensers.

WITH THE COVER OPENED

The plan of the internal arrangement is the same as that shown at D in Fig. 1. With the band-spreading coils in place, the normal control-grid clips fasten to the dummy insulating plugs mounted on the compartment walls. The partitions are welded to the sides of the cabinet but are insulated from the base by an air gap.

A GOOD EXAMPLE OF HOW NOT TO SHIELD

A study of shielding in the development of the receiver described brought out some surprising points. The example illustrated looks good but isn't, as explained in the text. This arrangement is the same one shown at A in Fig. 1.

The next attempt was as shown at *C* in Fig. 1. This arrangement worked fairly well in comparison with its predecessors, but here, too, there was still excessive interaction. Perhaps the compartments were so large that the shielding effect was nowhere near complete since the effect of isolation of the coil compartments decreases very rapidly as the compartment size increases. Another disadvantage of this arrangement was the requirement of tube shields. There was, however, no detrimental effect when the chassis was placed in a metal cabinet.

After the experience gained with models *A*, *B* and *C*, we were able to arrive at the arrangement as illustrated at *D*. Here the compartments were small enough to properly shield and yet large enough so as not to increase the coil losses appreciably. Furthermore, there was no common partition between the coil compartments as had existed in models *A* and *B;* and which, no doubt, was responsible for the "cover" effect. The small baffle between the r.f. tube base and the coil was found essential in order to shield the plate lead and prevent oscillation.

In the final model it was found advantageous to make the vertical parts of the shielding integral with the metal cabinet rather than to weld them directly to the chassis. It was found also of further advantage to insulate the vertical parts of the shielding compartments from the chassis itself with a $\frac{1}{8}$" air gap and to weld them very thoroughly to the sides of the metal cabinet. The chassis, in turn, is grounded to the cabinet by several mounting screws on each side. Such an arrangement completed the shielding job by reducing interlocking to a negligible degree.

A further indication of the trouble to be experienced in attempting to use

a common partition between the coils in a short-wave receiver is illustrated at *E* and *F* in Fig. 1. This problem was recently encountered in the design of another receiver employing the same circuit. The separate compartments completely eliminated the r.f. oscillation and interlocking difficulties.

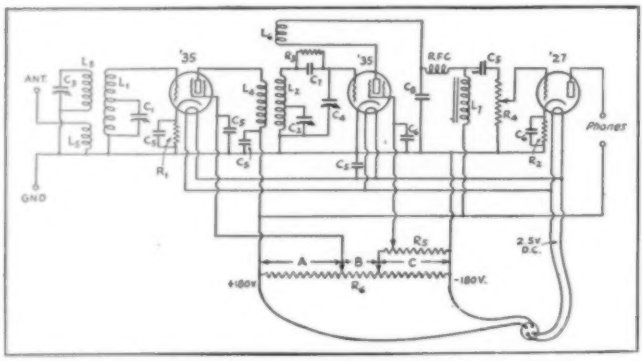


FIG. 2 — THE ALL-A.C. VERSION OF THE RECEIVER

L_1, L_2, L_3, L_4, L_5 and L_6. See table of r.f. transformer specifications.
L_7 — 750-henry plate coupling reactor. A good audio transformer with primary and secondary connected in series might be used.
C_1 and C_2 — 90-μμfd. ganged tuning condensers with insulating shaft coupling.
C_3 — Midget type trimmer condenser.
C_4 — 8-μμfd. detector transformer trimmer condenser (incorporated in coil form), Hammarlund No. 35.
C_5 — .01-μfd. non-inductive mica fixed condensers.
C_6 — .5-μfd. non-inductive paper fixed condensers.
C_7 — 100-μμfd. mica grid condenser, small type. Incorporated in detector r.f. transformer.
C_8 — 250-μμfd. mica by-pass condenser.
R_1 — 500-ohm cathode resistor, 2-watt type.
R_2 — 2000-ohm cathode resistor, 2-watt type.
R_3 — 5-megohm grid leak, one in each detector transformer.
R_4 — 500,000-ohm calibrated tapered type potentiometer. See text.
R_5 — 50,000-ohm regeneration control potentiometer.
R_6 — B-voltage divider, total resistance 12,000 ohms divided as follows: A, 6900 ohms; B, 2000 ohms; C, 3100 ohms.

STEEL *vs.* ALUMINUM

Perhaps a word regarding our experiences with steel and aluminum as shielding material also might be of interest at this point. It is only too well known that on the extremely low frequencies, say for instance 60 cycles, iron is definitely better as a magnetic shielding material than aluminum. As the frequency increases, however, this difference rapidly diminishes until at broadcast frequencies it has practically completely disappeared; and from then on up, from a purely shielding point of view, there appears little, if any, actual difference.

But there are several other aspects to be considered additional to the pure shielding effect. One of these is the introduction of losses when shielding is placed close to a coil. It is for this reason that in the design of the receiver care has been taken to keep the steel shielding partitions everywhere separated from the r.f. transformers by distances at least equal to the coil diameter. At this, or greater distances, there seems to be no noticeable difference in the resistance of the r.f. transformers whether the shielding be aluminum or steel. In the design of receivers where it is necessary to place the shield closer than the diameter of the coil at any point, then there is a marked advantage in using aluminum or some other non-ferrous material.

In high frequency work our present concern, the real advantage of the use of steel over aluminum, lies in its shielding of the receiver as a whole from the low frequency (60-cycle) magnetic field which generally so completely envelops the ham operating table and which, in many cases, results in a strong a.c. hum in connection with aluminum shielded battery type receivers. Then, of course, there is the matter of the so-called "water-tight" shield joints, which are so hard to obtain with aluminum and so easy to obtain commercially by welding with steel or by soldering with copper.

GANGING

At the present state of the radio art there is no excuse for a 2-condenser type receiver that is not truly single-dial control in the fullest sense of the term. In the present receiver, such control is obtained by the mounting of the two tuning condensers in tandem by means of a flexible insulating coupling unit.

The trimmer condenser, C_3, shown in the diagram and photograph is not an auxiliary tuning control to be juggled along with the main tuning dial. It is for the sole purpose of supplying the varying amounts of capacity "padding" required with the different transformers. This capacity well might be incorporated in the transformer itself if it were not for the unknown capacity-loading effect of the antenna system. Therefore, it is merely necessary to set the trimmer whenever a pair of r.f. transformers is plugged in and then not touch it until the transformers are replaced or a different antenna is connected. Many operators determine the proper adjustment of this trimmer condenser by adjusting for maximum background noise but a more accurate way is to adjust the trimmer for the point of minimum setting of the regeneration control that will produce oscillation in the detector circuit.

The two tuning condensers are of the same maximum capacity, namely, 90 μμfd., and are of the straight-frequency-line type with 270° rotation. This latter feature gives a 50% greater spread of the tuning range for a given set of transformers; or, conversely, for a given degree of

criticalness of tuning it reduces by 50% the number of coils required to cover the entire frequency range from 33 mc. to 1500 kc. While it might seem that a more compact and better mechanical arrangement would be the employment of a special single unit 2-gang condenser, such has proven not to be the case. It was found that even though the frames of the two separate condensers were grounded to the main chassis, the breaking of the common shaft by means of the insulated flexible coupling unit, in the manner illustrated, was a very important factor contributing to the complete elimination of the natural tendency of the r.f. stage to interlock and oscillate when the detector was thrown into oscillation by the regeneration control. In a specially constructed single unit, 2-gang condenser, using the same general type of design as employed in the individual condensers but having a common shaft, it was found that while shielding partitions would eliminate the greater part of this interlocking tendency, there was always a trace left that could not be completely cured.

The special mechanical features of the condensers, such as the insulated main bearings (to eliminate the shorted turn effect of the frame), the constant impedance pigtail and the special insulation material have already been described in detail in *QST* in the article to which there has been previous reference.

R.F. TRANSFORMERS AND BAND-SPREADING

Following the policy of careful attention to all details of a simplified circuit, in order to secure maximum performance a special molding material was selected for the transformer forms. The use of this low-loss material permits the winding of the coil turns into grooves turned into the solid walls of the forms, thus resulting in a rigid transformer that will stand up under quite rough handling. This special molding material, known as "R-39," differs from the ordinary in that it contains absolutely no wood flour or other moisture absorbing filler, the presence of which has been discovered by the R.F.L. people to be the cause of the losses and variations in dielectric qualities of molded bakelite when placed in high frequency fields.[3] As a result of the practical elimination of dielectric losses in the transformer field, not only is the sensitivity materially increased, particularly in the r.f. stage where no appreciable amount of regeneration exists, but also the selectivity is improved due to the very substantial reduction of the r.f. resistance of the tuned circuits. In the case of the transformers that were developed for the 33- to 20-mc. range, it was found that the detector refused to oscillate when these coils were wound on forms molded of ordinary bakelite, whereas no difficulty whatsoever was encountered when the special "R-39" low-loss material was used in the same molds for making the forms for this range.

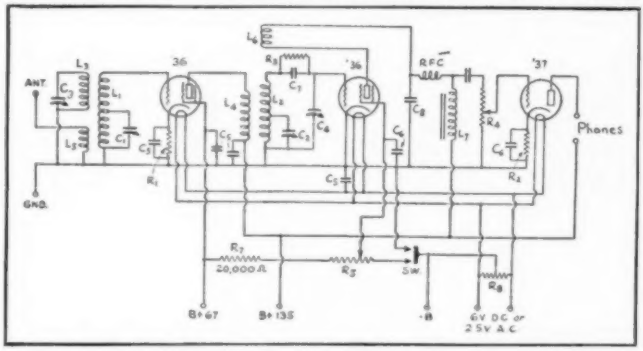


FIG. 3 — CIRCUIT OF THE COMBINATION A.C.-D.C. MODEL

Specifications are identical with those of Fig. 2, with the following exceptions:
R_7 — 20,000-ohm 2-watt type resistor.
R_8 — 50- or 100-ohm filament center-tap resistor, necessary only with a.c. filament supply.
SW — Regeneration control and cathode circuit switch.

While this new receiver is so designed that any of the standard six-prong transformers developed originally for another receiver [1] may be used with it in order to cover the range from 33 mc. to 350 kc., since it has been designed primarily for amateur work it has a special set of band-spread transformers as standard equipment. The three pairs of band-spread transformers are for the 14-, 7- and 3.5-mc. amateur bands. In general appearance, as will be seen from the accompanying photographs, the new band-spread coils differ from the conventional coils only in that a lead comes out of the top for clipping directly to the cap of the screen grid tube, in place of the lead built into the receiver. In order that the clips in the receiver may not dangle about and short circuit on the metal chassis or cabinet, dummy

R.F. TRANSFORMER SPECIFICATIONS

Winding	*14,000-kc. Band*	*7000-kc. Band*	*3500-kc. Band*	*Size Wire*
L_1 and L_2	10 t.	21 t.	35 t.	No. 22 Enam.
Tap, turns from bottom	2¼	5¾	16¾	
L_3 and L_4	8 t.	16 t.	22 t.	No. 34 d.s.c.
L_5 and L_6	3 t.	4 t.	4 t.	No. 34 d.s.c.

R.f. and detector stage transformers are identical except that a grid leak, grid condenser and trimmer condenser are incorporated in each detector transformer. The grid leaks are each 5 megohms, the grid condensers each 100 $\mu\mu$fd. and the trimmer condensers each approximately 8 $\mu\mu$fd. The plate winding (L_3 or L_4) is wound between the turns of the grid winding (L_1 or L_2), starting at the bottom of the coil. Additional details are given in the text.

[3] Kruse, "A Multi-Range Receiver," *QST*, October, 1930.

insulating terminals are furnished for fastening them out of the way.

Inside each detector coil form there is a small grid leak and grid condenser, as well as an adjustable low-capacity trimmer condenser. The schematic diagrams of Figs. 2 and 3 show how the band-spreading is accomplished. Here it will be seen that C_3, the regular variable tuning condenser, now shunts only a portion of the total inductance while the grid leak R_3 and the condenser C_2 connect directly to the top of the coil. Finally, the trimmer condenser C_4 shunts this whole arrangement and is in parallel with the tube capacity, connecting directly from the grid to the filament. Fig. 4 shows a sketch of the coil, indicating how the prongs of the coil are connected and the disposition of the screen grid lead which comes out of the top of the coil. The particular l/c ratio in this arrangement results in a circuit of a high order of sensitivity; sufficiently more so than with the conventional arrangement as to be readily detectable by listening tests.

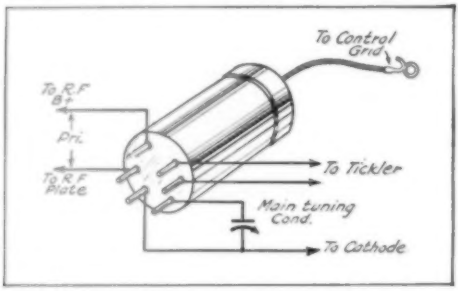


FIG. 4—A SPECIAL SIX-PRONG BASE AND A FLEXIBLE LEAD ARE NECESSARY FOR THE SEVEN CONNECTIONS TO EACH R.F. TRANSFORMER

Full constructional details are given in the table of transformer specifications. In all three sets of transformers the grid winding has its turns spaced so that the length of winding is equal to the diameter. The primary or plate winding is then wound between the turns of the grid winding, starting from the "ground" end and working up approximately two-thirds of the way toward the grid end. The location of the tap for the tuning condenser must be accurate to the fraction of a turn indicated in order to spread the particular band over approximately 75 dial divisions. The tickler or antenna coil is wound in the slot at the bottom of the coil form and the center of this slot is located approximately ¼-inch below the end of the grid winding.

The value of approximately 8 $\mu\mu$fd. for the trimmer condensers given in the table is the capacity at which the condensers are set when in normal use. The particular condensers used for this purpose are the standard Hammarlund Type No. 35.

THE 7000-KC. BAND-SPREADING DETECTOR TRANSFORMER

A special six-prong form is used with the turns of the plate coil for the r.f. tube wound between the turns of the detector grid coil. The adjustment screw of the trimmer condenser is readily accessible from the top. The tickler winding is in a slot at the lower end of the form and the grid condenser and leak are inside, beneath the trimmer condenser.

VARIABLE-MU REGENERATIVE DETECTOR

From a purely circuit point of view, one of the several outstanding features of the all-a.c. version of the receiver lies in the use of the Type '35 variable-mu tube as a regenerative detector. Perhaps the reasons that intrigued us into the investigation of the possibilities of the '35 as a high-frequency regenerative detector was the statement made on the data sheets supplied with the tubes, to the effect that their use as detectors was not recommended, plus George Grammer's story on this tube in the May issue of *QST*, in which he intimated that while perhaps the tube manufacturers were right with reference to the use of the '35 as a plate detector, it certainly ought to make a good grid detector. Numerous investigations and experiments during the past few months have borne out this theory.

From past experience in designing high-frequency receivers employing the Type '24 screen-grid tube as a regenerative grid detector, it had been found that of the various methods of regeneration control the most satisfactory was the variation of screen voltage by means of a potentiometer. But how would the action of the '35 tube as a grid detector differ from the '24 when its screen voltage was shifted? For some unknown reason the tube manufacturers in their data sheets and their "engineering and specification reports," as supplied to the radio set manufacturers, seem to be surprisingly consistent in at least one respect; namely, the complete omission of any curves that might throw some light on the subject. It was soon found that this relation is of an inverse exponential nature. Thus when the screen voltage of the '35 is increased from a low value, the tube rapidly approaches an oscillating condition. The nearer the tube approaches the spill-over point, however, the less effect the increasing of screen voltage has upon its tendency to oscillate. Consequently we have a regeneration control that permits of readily obtaining and maintaining a higher degree of regeneration with

the attendant smooth sliding into oscillation so much sought after in ham receivers of the past and obtained only to a fair degree by the careful selection of tubes and the juggling of grid leak and condenser values.

This same characteristic of the '35 that permits of this higher order of regeneration also results in a more stable condition with regard to the holding of the regeneration adjustment when once set. There seems to be entirely lacking that tendency of regenerative detector tubes of ordinary kinds to suddenly "pop" into oscillation on the slightest provocation.

THE AUDIO SYSTEM

The detector output is impedance coupled to the single audio stage by means of a plate choke coil of extremely high inductance value. It was found that the use of an inductance of much higher order than possible with practicable transformer coupling resulted in much higher coupling efficiency and complete elimination of any tendency towards howling, roughness or "backlash" in the regeneration control. These difficulties were encountered to a very objectionable degree when straight resistance coupling was employed.

The grid leak of the impedance coupling arrangement is the attenuation control potentiometer. Such a control was found essential due to the high sensitivity of the receiver and consequent "too loud for comfort" signals when using a head set. Such an audio coupling system results in an extremely flat characteristic over a wide frequency band, making the receiver ideally suited for phone reception.

Originally, serious consideration was given to the inclusion in the circuit of a tuned filter arrangement to follow this coupling device, so as to give a highly peaked audio characteristic for c.w. reception; but as a result of observing some investigations being conducted by Ross Hull, Jim Lamb, and George Grammer at A.R.R.L. headquarters, undoubtedly to be discussed in *QST* in the near future, the peaked audio idea was abandoned, at least for the present.

CALIBRATED ATTENUATION CONTROL

With a potentiometer in the grid circuit as the volume control, it has already been shown how it may perform the double duty of volume control and audibility meter.[1] Fig. 11 shows how the taper of the resistor is determined so that the angle of rotation is directly proportional to the "R" rating of signal intensity. In this case, the total resistance used is 500,000 ohms.

When the contact arm is at the high end, there is zero attenuation and the level of a signal just audible at such an adjustment would be "R1." Likewise, when the control arm is at the other extreme, only a signal of enormous intensity will "get through" and thus the rating of "R9." Physically, the attenuation control is mounted under the chassis; so, like all the other audio components, it is completely shielded from the r.f. circuits and consequently not likely to cause any back coupling which would result in fringe howl. Furthermore, the control wheel is so mounted that it may be operated simultaneously with the main tuning dial, leaving the other hand free for the regeneration control. After operating the receiver a short time, one finds that he unconsciously shifts the attenuation control up and down as he moves from station to station so as to maintain the same signal intensity to the ear, thus making available at a glance a sufficiently accurate audibility reading at all times.

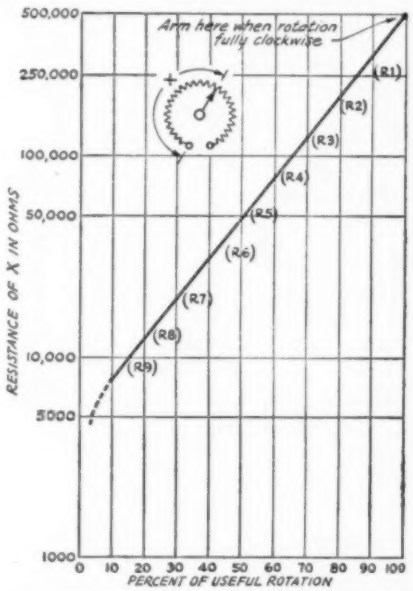


FIG. 5 — CALIBRATION CURVE OF THE COMBINED VOLUME CONTROL AND AUDIBILITY INDICATOR

To determine the audibility of signal, the control is rotated to the setting where the signal is just audible, the marking on the disc at this setting indicating the audibility in terms of the "R" system. The calibration is, of course, an approximation.

POWER SOURCES

For complete a.c. operation of the receiver, the type of power pack that has been previously described is recommended.[1] This power unit employs a Type '80 tube as a rectifier, an r.f. filter and a 2-section hum filter. The power transformer, in addition, is equipped with an electrostatic shield between the secondaries and the 110-volt winding, thus not only preventing any r.f. disturbances originating in the power supply from getting into the receiver, but also preventing

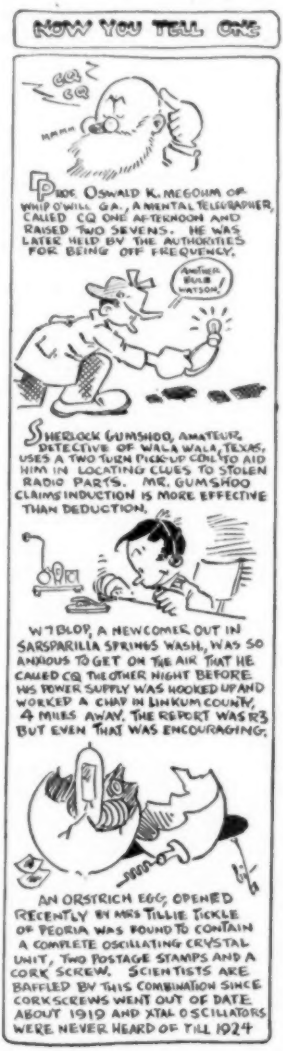
[1] McLaughlin and Lamb, "What Is This Thing Called Decibel?" *QST*, August, 1931.

r.f. disturbances originating in the rectifier tube from causing trouble. The elimination of this latter source of r.f. disturbance makes the operation of the receiver entirely free from the so-called "tunable" hum. As shown by the illustration and circuit diagram, the voltage divider resistor for the "B"-supply is located inside the receiver chassis, so as to eliminate any r.f. or common coupling in the power supply leads. By having the power supply a separate unit, any a.c. hum due to coupling between the power transformer and the detector plate coupling impedance is completely eliminated, thus reducing hum in the output of the receiver to an extremely low level.

A unique feature of the battery model is its design to use either battery or a.c. type tubes. When used purely as a battery operated receiver, then the new 6-volt 5-prong heater Type '36 and '37 tubes are recommended so as to permit operation from the standard 6-volt storage battery or "A" eliminator. As will be seen from the circuit diagram, a separate "B-minus" lead is brought out in the battery model. Thus the standard a.c. tubes, also being of the 5-prong UY-base variety, may be plugged in at any time in place of the heater-type battery tubes and the receiver adapted to a.c. operation.

As mentioned previously, an arrangement finding particular favor with many experienced amateur operators at this time is the use of a.c. on only the heaters of the a.c. tubes, so as to take advantage of economical operating costs and the superior characteristics of the '35 as a regenerative detector, "B" batteries being used for plate supply in preference to the so-called "B-eliminator." The operating advantage of such a combination shows up mainly on weak c.w. signals where a higher order of detector stability is obtained, due probably to the elimination of plate supply variations caused by line voltage fluctuations. It would also seem that there is a slight increase in freedom from detuning effects of the regeneration control when using batteries in place of "r.a.c." power supply. The extent of this improvement, of course, depends upon the type of power pack involved and is much more noticeable when using the conventional type "B-eliminator" than when using a special type of power unit designed strict for high frequency receiver operation.

When using the battery model of the receive with the combination a.c.-d.c. power supply, a common center-tap resistor should be connected across the heaters *inside the base of the chassis.* It has been found that erratic operation will result on some frequencies if this center tap resistor is placed across the heater terminals of one of the sockets, particularly the detector. If the receiver is to be used alternatively with a.c. and d.c. type tubes, provision should be made for removing this resistor from the circuit when operating with a filament battery so as not to impose a parasitic load on the batteries.


NOW YOU TELL, ORG
PROF. OSWALD K. MEGOHM OF WHIP O'WILL, GA., A MENTAL TELEGRAPHER, CALLED CQ ONE AFTERNOON AND RAISED TWO SEVENS. HE WAS LATER HELD BY THE AUTHORITIES FOR BEING OFF FREQUENCY.
ANOTHER BULB WATSON!
SHERLOCK GUMSHOO, AMATEUR DETECTIVE OF WALA WALA, TEXAS, USES A TWO TURN PICK-UP COIL TO AID HIM IN LOCATING CLUES TO STOLEN RADIO PARTS. MR. GUMSHOO CLAIMS INDUCTION IS MORE EFFECTIVE THAN DEDUCTION.
W7BLOP, A NEWCOMER OUT IN SARSPARILLA SPRINGS WASH., WAS SO ANXIOUS TO GET ON THE AIR THAT HE CALLED CQ THE OTHER NIGHT BEFORE HIS POWER SUPPLY WAS HOOKED UP AND WORKED A CHAP IN LINKUM COUNTY, 4 MILES AWAY. THE REPORT WAS R3 BUT EVEN THAT WAS ENCOURAGING.
AN ORSTRICH EGG; OPENED RECENTLY BY MRS TILLIE TICKLE OF PEORIA WAS FOUND TO CONTAIN A COMPLETE OSCILLATING CRYSTAL UNIT, TWO POSTAGE STAMPS AND A CORK SCREW. SCIENTISTS ARE BAFFLED BY THIS COMBINATION SINCE CORKSCREWS WENT OUT OF DATE ABOUT 1919 AND XTAL OSCILLATORS WERE NEVER HEARD OF TILL 1924

For complete battery operation, the 6-volt heater tubes were selected not only because of the convenient 5-prong base making them interchangeable with the a.c. tubes and because of the general availability of 6-volt storage batteries, but also because of their freedom from the microphonic howls that are causing so much grief where the 2-volt type d.c. tubes are being used. At this writing, a variable-mu tube with a low-current d.c. heater is not available so that it is necessary to use the Type '36 as the screen-grid detector, for the present at least. As soon as the value of the variable-mu tube as a regenerative high-frequency detector is more generally appreciated, however, battery operated models will no doubt become available.

Since the receiver measures but 9¾" x 7", it should prove well suited to portable aircraft, and other services where space is an important factor. Replacement of the Type '37 audio output tube by one of the Type '38 pentodes of the same series (in the battery model) provides a genuinely compact outfit for speaker operation. In fact, such a change in the audio system results in a rather good short wave b.c. receiver.

Strays

The current consumption of the a.c. relay described on page 32 of the May issue is not one ampere, as stated, but one-tenth ampere.

The C.C.I.R. Meets in Copenhagen

Our Secretary Attends Second Meeting of International Technical Committee as Member of United States Delegation—No Decisions Affecting Amateurs

By K. B. Warner, Secretary, A.R.R.L.

THE International Technical Consulting Committee on Radio Communications (called C.C.I.R. from the initials of its title in French) held its second meeting at Copenhagen, Denmark, from May 27th to June 8th of this year. I had the honor of participating as a member of the United States delegation, representing amateur radio. While the eventual results have little or no effect upon amateur radio, amateurs will be interested in hearing the story.

The C.C.I.R. is a technical advisory committee created by the Washington Convention, charged with the study of technical non-administrative problems which arise under the convention, and the issuing of non-binding recommendations thereon for the information of governments and private operating agencies. It does not have authority to make any changes in the provisions of the Washington Convention or its regulations.

Seven problems left over from the first meeting of this committee at The Hague and eighteen new questions proposed by various administrations constituted the field of work for this meeting. The United States commenced its preparations in June of 1930 by organizing a group of committees at Washington, made up of representatives of government and private radio activities. Many meetings were held to study the questions and prepare the viewpoints of this country. These meetings I had attended at the instructions of our Executive Committee. Concerning amateur matters, the United States planned to resist stoutly any attempts that might be made to put any new restrictions on our work.

Meanwhile the A.R.R.L. Board of Directors had ordered me to represent the League at the Copenhagen conference, for, although the problems scheduled did not particularly refer to amateur work, there was no telling what might come up. Now, the C.C.I.R. regulations at present permit participation only by governments and private radio operating companies. Vigorously objecting to an arrangement where our affairs might be determined in meetings we were not permitted to attend, we had already made one endeavor to secure direct participation: at the request of the International Amateur Radio Union the Department of State had endeavored to arrange for our admission to the conference; Denmark was willing but three administrations objected to seating the amateurs, so that attempt failed. There being more ways than one to skin a cat, however, we applied for membership on the United States delegation, as had obtained in the case of our representation at The Hague, and when the delegation was named by President Hoover I had the pleasure of seeing my name listed as a technical adviser, eventually to be confirmed by a large certificate from the Secretary of State. For information, let it be said that the government did not pay my expenses — they were borne by A.R.R.L. Our government, though, believed that its amateurs should be permitted participation in such a conference, and took this method of obtaining it.

With the delegation named, more meetings were held, this time as delegation meetings, to continue the preparation. Just to add zest to the life of a secretary, the annual meeting of the A.R.R.L. Board of Directors came about this time. But eventually the delegation got away, sailing from New York on the *America* on May 13th. We had three official delegates: Hon. Wallace H. White, Jr., senator from Maine, chairman; Dr. J. H. Dellinger, chief of the radio

THE SECOND MEETING OF THE C.C.I.R. AT COPENHAGEN

Many famous faces in the radio art are to be seen in this picture, taken on the steps of the Christiansborg Palace, where the meetings were held.

laboratory, Bureau of Standards; and Dr. C. B. Jolliffe, chief engineer of the Federal Radio Commission. Then there were seven technical assistants, all government men; myself in the status of technical adviser; a secretary; and an interpreting, translating and clerical staff of seven. Ten representatives of private radio operating companies also attended. Although not

THE U.S.A. REPRESENTATION AT COPENHAGEN

Consisting of the official delegation and clerical staff, and the representatives of American commercial companies. The United States party was the largest attending the conference.

members of the delegation, it was the policy of our country to permit them the freest participation in delegation meetings; indeed I probably would have been in that same status myself if regulations had permitted.

Let no one think such a trip is a junket. It was the hardest kind of hard work. We had all-day meetings every day on the steamer going over. When we reached Copenhagen offices were opened at our hotel, with the ever-essential American conference room, the staff was established, and throughout the stay our headquarters were a typically American bee-hive of activity. But that is getting ahead of my story.

We landed at Plymouth, went up to London for a day or two's rest, thence to Harwich and across the North Sea on a tiny Danish steamer to Esbjerg, a port on the west coast of Jutland, part of Denmark, and thence overland by rail to Copenhagen. It was evening when we reached Esbjerg and went out to inspect the place. Within a few minutes I was confronted by a puzzler: before my startled gaze hung a large sign which, in the familiar block letters, said *QST*. That is, it seemed to. Upon closer inspection it turned out to be *OST*. The place was tightly shuttered and gave no indication of what manner of institution it might be. The mystery was unsolved until I got to Copenhagen, where numerous *ost* signs greeted one on every hand. They seemed to be cheese stores; that indeed was it, for *ost* is *danske* for cheese. In fact, Danish amateurs tell me that their copies of *QST* are frequently mistaken for some sort of official organ of the cheese industry. While we've been told at times that *QST* was rather cheesy, in some folks' estimation, but this was the closest any one had come to proving it!

The conference at Copenhagen was very well organized by the Danish government. The meetings were held at the Christiansborg Palace, the parliament building. About two hundred representatives were present, speaking for the administrations and private agencies of nearly forty nations. It happened that the U.R.S.I. (International Scientific Radio Union) was holding its international congress in the city at the same time. Between the two organizations there was gathered at that time in Copenhagen an almost unbelievable galaxy of the technical radio talent of the world. Innumerable world-famous radio figures took part in the C.C.I.R. meetings.

On May 27th the conference opened and organized its committees, the next morning commenced hard daily work which went on without interruption until the closing day, June 8th, when a plenary meeting accepted the results and made arrangements for the next meeting. Most of the questions studied, by their very nature, had little or no reference to amateur radio. Many of them were capable, however, of developing angles injurious to our work, and required careful watching — to provide for which was, of course, the primary consideration in the League's original determination to be represented there. One question in particular, known as Question 11 on the Copenhagen agenda, proposed a study of the best uses to be made of various parts of the spectrum, and several of the suggestions which had been filed thereon proposed a reduction of amateur bands. Led by the United States, however, majority opinion opposed making any such study, as being outside the competence of the C.C.I.R., and the question was eventually given a completely technical complexion and left on the list of unfinished questions. This was satisfactory. Amateurs were rarely mentioned at the conference. Lest we become lonesome, however, we were favored about midway through the affair by a proposal from Cuba suggesting that there be added to the Washington Regulations a provision that the power permitted amateur stations on frequencies above 2000 kc. not exceed 50 watts. As far as I could see, not the slightest notice was paid this proposal by any person or committee, first because all proposals have to be filed before the start of a meeting and secondly because it was obviously out of order, since the C.C.I.R. cannot change the Washington document. The C.C.I.R. in fact is itself a creature of the Washington Treaty. No one knows what inspired this unusual document from Cuba. Her representative at the conference was her consul to Denmark; perhaps the gentleman thought that he really ought to file some sort of papers and,

casting about for a target, decided to try a pot-shot at the amateurs. Nothing, of course, came of it.

In viewing the work of this C.C.I.R. meeting it is important to realize that this was *not* one of the major conferences like Washington was, like Madrid will be, where allocations and other important provisions of regulation are discussed. This was an intermediate meeting and a purely technical one. There was no conceivable opportunity for us to *enlarge* our rights or privileges under the Washington Regulations, for they were not at issue. In general terms, from the amateur standpoint it might be said that a C.C.I.R. conference is primarily a place where certain annoying restrictions may be proposed and where a certain amount of scrapping may be necessary to preserve the status quo. From our viewpoint, then, we may say that a wholly successful C.C.I.R. conference is one which escapes all such troubles. In the final results of this conference, amateur radio is not so much as mentioned. The opinions adopted are practically without any effect upon us or application to our work. It seems unnecessary to go into detail concerning the decisions taken. Twenty-one formal opinions were adopted. They deal with such things as arrangements to connect marine radiotelephony to the land nets, revision of The Hague tolerance table for commercial services, methods for comparing national frequency standards, recommendations for reducing interference in the fixed-mobile shared bands above 6000 kc., elimination of non-essential emissions, suppression of side bands, elimination of compensation waves in arcs, separate calls for each frequency in the fixed service, a study of technical methods for stabilizing transmitters, etc. (Naturally much of the technical material submitted was quite interesting. Much of it, we hope, will receive a wider distribution through publication by our government and in this and other journals.) In addition to these opinions, fourteen new questions were formulated and "farmed out" to centralizing governments to prepare studies thereon. Again these new questions promise no particular administrative effect upon amateurs, although a great deal of the engineering data accumulated in their study ought to be of interest to us, for they involve such questions as key clicks, modulated telegraph transmissions, radiotelephony on small vessels, quickly shifting frequency with accuracy, etc. One of them, a study of technical features influencing allocation of frequency bands, is the new form taken by Copenhagen's old Question 11, previously referred to. In its present form it is to be purely a technical study, centralized with Great Britain.

Some of the European nations were planning to arrange at Copenhagen to transmit a series of recommendations to the Madrid conference — recommendations for regulations admittedly outside the power of the C.C.I.R. to inaugurate itself but which, because they came from the C.C.I.R., doubtless would have great weight at the Madrid meeting. At A.R.R.L. Headquarters we felt that if the C.C.I.R. were permitted to engage in such a move, there would most likely be some recommendations unfavorable to the amateur, improperly biasing the situation at Madrid. We felt

COLONEL FULDA

An interesting snapshot of the president of the D.A.S.D., taken at their recent convention at Hamburg. Col. Fulda has been in radio since its beginnings, and was in charge of German communications on the western front during the late war.

that such action by the C.C.I.R. was improper and naturally it was our desire that no such recommendations be transmitted. Several of the administrations were definitely of that same view, and after a vigorous discussion it was decided that the conference did not have the power to make recommendations of this nature; instead it was decided merely to incorporate all the opinions of both C.C.I.R. meetings as an appendix in the Madrid Book of Proposals, to be published later this year. So again that was that.

Of course another reason the Board sent me to Copenhagen was the opportunity for contact on behalf of Madrid. Every spare minute was used for improving acquaintance with the other delegations, doing missionary work and explaining about amateur radio.

So ended the second meeting of the C.C.I.R. It is next to meet in Lisbon, Portugal, but not until after the large international conference at Madrid in the fall of 1932. At this meeting the frequency table will be examined anew and it may well be that important changes will occur then. The Madrid meeting, in short, will have that authority which the Copenhagen meeting didn't — to change the assignment of bands to services — and the whole future course of amateur radio will again be at issue. For that reason I would like to urge anew upon the amateur societies of the world that they make it their special business in this intervening year to establish friendly contact with the radio administrations of their respective countries, and endeavor to give them an appreciation of the value of amateur radio, an understanding of what it is all about, and an indication that they demand to be fairly treated at Madrid. If each of our societies will make this effort in its own country it will go a very long

ways towards creating, at Madrid, that necessary background of recognition of the usefulness and importance of amateur radio.

VISITING THE EUROPEAN SOCIETIES

Any such visit to Europe offers a splendid opportunity for visiting the European amateur societies. Although limited for time and not able to move as freely as I would have liked, I did make good contact with three of our sister societies on the other side.

In London I had the pleasure of renewing acquaintance and chewing the rag with several officials of the Radio Society of Great Britain, particularly including their president, Mr. H. Bevan Swift, their acting vice-president, Mr. Arthur E. Watts, hard-working Hon. Secretary Jack Clarricoats, and Mr. H. B. Old, provincial district representative on the Council. Everybody is well and happy, the R.S.G.B. flourishing, amateur interest showing the same increasing keenness that it is here. In London, too, I met my old friend Dr. Curt Lamm, D4AFA, foreign secretary of the D.A.S.D., whom I was to see later in both Copenhagen and Berlin.

THREE AMATEUR SECRETARIES MEET

in a mutual-commiseration meeting at Copenhagen and pose for posterity. Standing at the rear is Dr. Curt Lamm, foreign secretary of the Deutscher Amateur Sende-und-Empfangs Dienst. Seated at the right is Mr. Helmer Petersen, secretary of the Experimenterende Danske Radioamatorer. K. B. Warner, secretary of A.R.R.L. and I.A.R.U., is at the left. The Y.L. is Miss Inger Lorentzen, manager of the E.D.R. QSL Bureau.

While in Denmark I was in close touch with the officers of *Experimenterende Danske Radioamatrer*, particularly Mr. James F. J. Steffensen, their president, and Mr. Helmer Petersen, their secretary. At a dinner which the E.D.R. Board gave me, I was notified of my election to honorary membership, an appreciated honor. Mr. Petersen and his Y.L. did their best to find some nightingales for me to hear, a new experience for me, as nightingales are apparently owned exclusively by Denmark and the British Broadcasting Corporation. They wouldn't perform on the evening in question, however, and it was only on a visit to OZ7T, a very pretty 100-watt station an hour to the north of Copenhagen, that I heard them. There is nothing rotten in Denmark except the weather. That indubitably is, at least to a resident of this part of the U. S. A. Whenever the temperature gets up to 55 or so, the Danes think they are having a heat wave. Beautiful though the country certainly is, it lies in about the latitude of middle Labrador, and even a hard-working Gulf Stream can't do much about that. I had to come home to get warm. I did, all right! If you want to feel some real heat, just stay out of this country until the end of June and then disembark during a heat wave which is a heat wave!

After the Copenhagen meeting I went down to Berlin to visit the *Deutscher Amateur Sende-und-Empfangs Dienst*, the amateur section of the D.F.T.V. The German amateurs are fine fellows, their enthusiasm tremendous, and in the face of huge obstacles. D.A.S.D. is an important society, not only representing the German amateur but providing sections for the amateurs of neighboring countries not sufficiently numerous to support their own societies, notably Austria and Yugoslavia. One judges that only the political situation prevents a fuller recognition of the amateur in Germany; the hope is warranted that this will soon occur. I met almost all of the D.A.S.D. officials in the Berlin area, particularly Colonel Fulda, their president, and had many an interesting rag-chew. They too gave me a dinner, presented me (already a member) with their emblem, another of the series of familiar black-and-gold diamonds. D.A.S.D. has a splendid new high-power headquarters station under construction, hopes for a direct schedule with W1MK. Dr. Curt Lamm, D.A.S.D.'s foreign secretary, arranged a most interesting program for my stay in Germany, with various amateurs assigned to pick me up at different times to "go places and do things."

My plans for a more protracted stay in Germany and for a visit to the R.E.F. in France were unfortunately curtailed at this point by illness brought on by the intensive work of the conference and by general overdoing the previous two months, so that I had to cut short my trip and sail quietly from Hamburg. I greatly enjoyed my visits to these amateur societies in Europe, particularly the opportunity for the interchange of ideas with the officers. I am highly appreciative of the courtesies shown me by all the amateur associations I visited, and I hope that A.R.R.L. may have the opportunity to reciprocate should any of their officers be able to come to this country.

Strays

Mr. G. C. Shadwell of New York City calls our attention to the fact that the address on the letter from G2ZC in the May issue shows him to live in Jersey *City*. The correct address is Jersey, Channel Islands.

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These are the days when a young man finds it difficult to decide whether to spend the evening oscillating or osculating.

— *W2CBJ*

Practical Electron Transmitters and Receivers

By John N. Dyer, W1CCZ*

MUCH interest in the Barkhausen-Kurz type oscillator is developing in amateur circles. Fortunately the oscillations are very simple to obtain providing the proper methods are used. Moreover, without any great expense the amateur can set up transmitters and receivers for the Barkhausen-Kurz (B-K) oscillations. The B-K oscillator should prove to be a most fruitful field for the ham who likes to experiment with new developments in radio and, incidentally, the serious experimenter has an excellent chance to aid materially in its development, since not a great deal is known about it as yet.

The theory of the B-K oscillator has been outlined in a previous issue of *QST*,[1] and may be found in some of the more technical journals if the reader is interested in a thorough treatment of the subject. However, in order to remind the reader of the most essential facts, the theory is outlined below.

THEORY OF THE B-K OSCILLATOR

In the B-K oscillator using a triode, the potentials on the grid and plate are reversed from those in an ordinary regenerative type oscillator in that the grid is quite positive and the plate is zero or negative with respect to the cathode (filament). The main electron flow will be from filament to the grid, but a small number of the electrons will miss the grid, since it is not a solid electrode, and will travel on towards the plate. On their trip from the filament to the grid the electrons are accelerated but after going through the grid the force on each electron will be opposite to its direction of motion and it will be retarded. If the plate voltage is negative, the electrons will reverse and travel back to the grid without touching the plate. During their journey, the electrons have induced a.c. voltages on the grid and the plate. It is these a.c. voltages generated by the electron motion that build up across the external circuit and furnish useful power. The work done by the electrons will be positive or negative depending on the phase of the a.c. voltages on the grid and plate. If they are of such phase as to oppose the motion of the electrons, the electrons will arrive at the grid with less energy than those that went directly to the grid without any oscillatory motion. The energy that has been lost has gone into the external circuit and if this energy is sufficient to supply the dissipation losses in the circuit, the action will be self-sustaining, supplying its own a.c. voltages. This theory was first developed by Gill and Morrell in 1922.[2]

There has been some question as to the difference between the so-called Gill-Morrell and the Barkhausen-Kurz oscillations. Barkhausen and Kurz, in their original paper,[3] stated that the oscillations were independent of the external circuit while Gill and Morrell found them to be dependent. However, it appears the G-M and B-K oscillations are actually different degrees of the same type of oscillation, and in neither case can it be stated that the oscillations are entirely independent of either electrode voltages or of the external circuit tuning, but rather that they are dependent on a combination of the two. In order to obtain the maximum amount of power from the B-K oscillator, the constants of the external circuit should be adjusted to correspond to the natural period of the electron motion within the tube, as determined by the voltages and the dimensions of the electrodes.

THE CG-1162

SUITABLE TUBES

Since the wavelength of the oscillations is dependent on the electrode spacing, it will be seen that only tubes with cylindrical electrodes or with all electrodes in the form of planes, where the spacing between the planes is small compared to the dimensions of the planes, will be satisfactory.[4] With the standard tubes

* Care of E. C. Crossett, Wianno, Cape Cod, Mass.

[1] Lamb, "Developments in Ultra-High Frequency Oscillators," *QST*, July, 1931.

[2] Gill and Morrell, *Philosophical Magazine*, Vol. 4 (1922), 161.

[3] Barkhausen and Kurz, *Zeitschrift für Physik*, Vol. 21 (1920), No. 1.

[4] It has come to our attention that for triodes having cylindrical elements concentrically arranged, the optimum ratio of plate-grid to cathode-grid spacing is approximately 2.5 to 1. — EDITOR.

available to-day only the former type may be realized, although it would be possible to construct a tube with a flat, thin, indirectly heated cathode for the latter type. No success has been had with any of the present-day tubes with the familiar "bath tub" type of construction. Tubes of this type that have been tried without success are as follows: Type '01, '01-A, '02, '10, '12-A, '03-A, and '04.

This leaves only a few tubes that are suitable and some of these are not too satisfactory from the standpoint of tube life. Since the grid is run at a positive potential, the d.c. grid current is always very high. With many types of tubes with

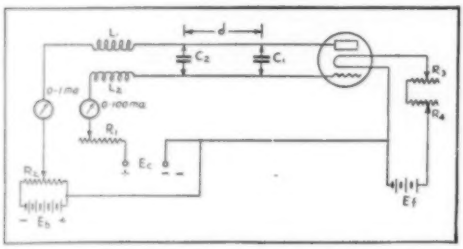


FIG. 1.— TYPICAL B-K OSCILLATOR CIRCUIT
Values for the components are given in the text.

thoriated or oxide coated filaments, the filament current necessarily must be very much below rating. In several types of tubes it is necessary to adjust the filament current to a value that will depend on the grid voltage rather than on the rated filament voltage. If this is not done, no oscillation will be obtained. The author has not found the reason for this dependence of filament current on grid voltage in the oscillator. It is apparently not directly due to either initial velocities of emission or to space charge, since a change of either would not result necessarily in a stoppage of oscillation, but rather in a change of wavelength. Certain tubes show this effect much more than others.

The other reason for holding the filament current below rating is that thoriated and oxide coated filaments have a very large emission at rated filament current, and consequently the grid current would be very high, probably enough to melt the grid. The result of running the oscillator with such tubes is that they lose their emission and soon require rather high filament currents. In the case of a small tube one need not worry about this point, since after its emission drops the filament current may be raised until it operates satisfactorily — and the loss is not very great if it does burn out. With large power tubes, the ham ordinarily is not willing to sacrifice the tube for a short experiment on B-K oscillations, so unless the tube has a plain tungsten filament it is not advisable to use it. The satisfactory tubes for the oscillator are the Type '27 and probably its brother the '37, the CG-1162 (an old tungsten filament Navy tube selling in the salvage stores at a very low price) and foreign tubes such as the Mullard 0:150 and the 0:50 (150 and 50 watts rsepectively); or other tubes with cylindrical construction and plain tungsten filaments. If anyone is lucky (?) enough to have any '52's that have lost their emission, but with the filament still in one piece, he will find that it is an excellent oscillator. Possibly a few hams will set aside a couple of good '52's as martyrs to the cause of B-K oscillations. The CG-1162 is really the best tube available for a low power oscillator although the Type '27 may be operated and will become stable after a certain amount of operation. However, this stability will not be reached until the emission from the tube has dropped so far that the filament has to be run on about four volts, at which point it will be found to be quite satisfactory and stable. In the standard make of tubes tried, the filaments withstood this voltage without burning out.

PRACTICAL CIRCUITS

There are many types of circuits that may be used, but the simplest is shown in Fig. 1. The tube need not be de-based, as experiment has

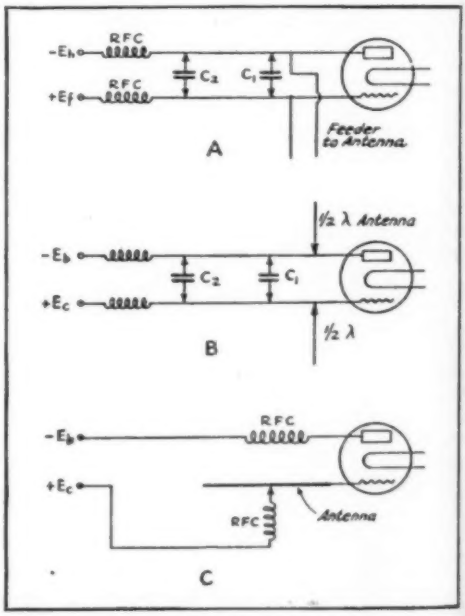


FIG. 2.— THREE METHODS OF COUPLING TO THE RADIATOR

shown that little is gained if this is done. The Lecher-wire tuning circuit may be fairly long. For a Type '27 or a CG-1162 a three-foot length is convenient, since it allows measurement of wavelength on the same wires as are being used

for the oscillatory circuit. It is convenient, but not necessary, to use copper tubing or brass rod for the Lecher wires since these materials have the advantage of stiffness. The two tubes may be mounted between stand-off insulators at the ends of a board and spaced by about three inches. L_1 and L_2 are r.f. chokes each consisting of a few turns well spaced on a tube. About 20 turns spaced ¼-inch on a 1-inch diameter form will be found satisfactory. R_1 is a variable resistance capable of handling the heavy grid current which may be 50 ma. in the case of the CG-1162 or the '27. The grid of the tube will run red or white hot, but as long as it does not melt it will be possible to run it that way continuously if the tube is not gassy, since at the grid voltages used there is little danger of arcing at the seal of the tube.

The purpose of R_1 is to vary the grid voltage from about 75 to 250 volts. If some other method of varying the voltage in small steps is at hand this resistor is not necessary. The value of R_1 will depend, of course, on the voltage of the power supply used. R_2 is a small potentiometer with which to vary the plate voltage from about zero to −10 volts. The plate battery may be a small "C" battery, but the grid voltage had best be supplied by a "B" eliminator unless storage "B" batteries are available, since the drain is really too heavy for ordinary dry-cell "B" batteries. R_3 and R_4 are filament rheostats, one of low resistance for fine adjustments and the other of higher resistance for coarse adjustments. The filament supply had best be a battery, but may be a.c. if no storage battery is at hand. For 'phone work, however, the use of a.c. on the filament will cause about 100% hum modulation. The condensers C_1 and C_2 may be of any convenient value, such as .002-μfd., and are arranged so that they may be moved along the Lecher wires.

A few sample values of voltages and wavelength are given below for the CG-1162 tube, the Type '27 values being similar, except for filament voltage.

E_c Volts	E_b Volts	I_c Ma.	I_b Ma.	E_f Volts	Wavelength, Centimeters
195	−14	45	2	6.5	42
90	− .5	15	.5	5.5	70
130	− 4	30	.8	5.9	55

E_c, grid voltage; E_b, plate voltage; I_c, grid current; I_b, plate current; E_f, filament voltage.

A low-reading d.c. milliammeter in the plate circuit is very necessary, as it is the best indication of oscillation. The small tubes do not give sufficient r.f. to be measured unless one possesses a very sensitive thermo-couple meter or a good galvanometer which may be used with a crystal detector. A 2-milliampere thermo-couple meter gives very good deflections without a great deal of coupling to the oscillator. A 4.5-ohm thermo-couple galvanometer reading 115 ma. full scale gave a deflection of two divisions out of 100 when connected directly across the Lecher wires with a particularly good CG-1162 tube as oscillator, on about 50 centimeters. This reading corresponds to a current of about 16 ma. When the tube is oscillating, the plate current will be from 0 to as high as 3 ma., depending on the tube and on the values of grid and plate voltages used. Since the plate current is roughly proportional to the amount of r.f. voltage on the plate when the mean plate voltage is fixed, it is a good indication of oscillation and adjustments of the Lecher wires may be made by it.

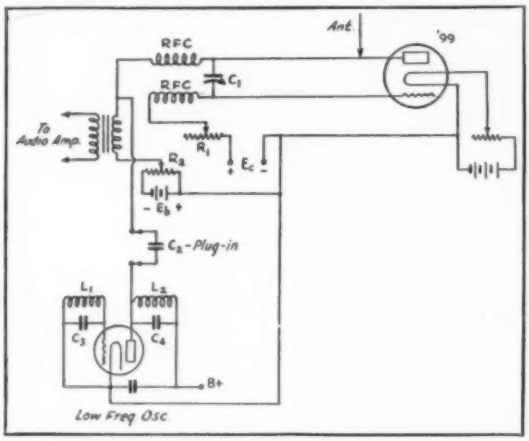


FIG. 3. — SUPER-REGENERATIVE B-K RECEIVER CIRCUIT

The details are given in the text.

WAVELENGTH MEASUREMENT AND ANTENNAS

In measuring wavelength, the second bridge, C_2, may be moved along the Lecher wires until the plate current shows a slight dip. The distance from this point to the point where the next dip takes place is approximately equal to one-half wavelength. This method is very convenient and does not require a separate system of Lecher wires, using instead the extended portion of the oscillatory circuit.

It should be stated that the commercial tubes of the types mentioned are not all good oscillators. Type '27 tubes were found to be the most uniform and CG-1162 tubes the least uniform, some refusing to oscillate at all. The CG-1162 tubes are so low-priced that any amateur may buy a dozen and use the ones that refuse to operate as B-K oscillators, on longer waves for other purposes.

The problem of putting power into an antenna may be settled in one of the ways shown in Fig. 2. Transmission lines may be used or else the oscil-

lator may be constructed with the antenna system as the oscillatory system, as in (b) and (c) in Fig. 2. In these two cases it is more difficult to adjust the wavelength since the antenna must be shortened or lengthened when the tube voltages are changed. The oscillator shown in (c) is very satisfactory and also probably the most efficient of the three types of circuit.

MODULATION AND MONITORING

In order to receive the transmitted signals, a modulated wave must be used. The transmitter and receiver are very unstable; a frequency stability as good as within .01% means a frequency variation of 50 kc. at the frequencies (around 500,000 kc.) being used. With such instability beat note reception is out of the question. For c.w. work the transmitter may be modulated at 1000 cycles or some other convenient frequency, signaling being accomplished

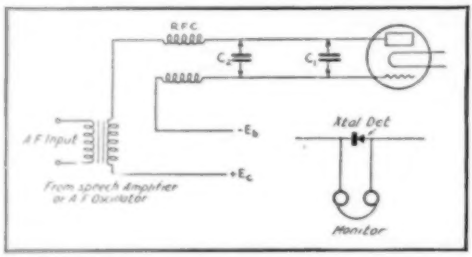


FIG. 4. — CONNECTIONS FOR MODULATED TRANSMISSION
The crystal detector monitor is shown below.

by either keying the modulation frequency source or the carrier. The most satisfactory place to modulate is in the plate circuit as shown in Fig. 4.

It probably will be found difficult to obtain good quality unless adjustments are made with the aid of some sort of monitor, one convenient type being made by connecting a pair of headphones across a crystal detector and connecting a short piece of wire on for an antenna. With this crude monitor, the signals may be picked up for several feet.

THE RECEIVER

The circuit of the receiver is quite similar to that of the transmitter and is shown in Fig. 3. The same type tube as in the transmitter may be used in the receiver if desired, although the '99 and similar tubes will be found satisfactory in certain cases. The choice of tube lies in the wavelength desired and it would be well to try all of the several different types of apparently suitable tubes that may be available since each one performs differently. The choice of tube will, of course, determine the size resistances used for the control of voltages. For small tubes "B" battery supply will be satisfactory since the drain will be low.

For tuning it is convenient to have the Lecher wires arranged so that their length may be varied. This may be done by allowing the tube socket to slide in guides with flexible filament leads and with the Lecher wires of telescoping construction, with about No. 6 to 8 wire sliding inside of copper tubing. Since the Lecher wires may be run on any odd quarter wavelength they may be made to cover a large wave band. As a typical instance, their length may be made to vary between 10 and 20 inches. Condenser C_1 is variable and furnishes a simple control of the wavelength over a limited range. It may be large, about 250-$\mu\mu$fd. since the tuning is not at all critical.

Super-regeneration should be used on the receiver and a low-frequency oscillator, such as that shown, should be coupled to the plate circuit. The coupling is made adjustable by arranging C_2 to be "plug-in." It will be small, probably near 100-$\mu\mu$fd., depending on the strength of the low-frequency oscillator. The tube in this oscillator may be anything that is available as may be the coils and condensers used in it since the frequency is not at all critical and may be from 10 to 100 kc.[5]

The antenna for the receiver may be arranged as for the transmitter and, if possible, a parabolic reflector with ½-wavelength reflector wires with the receiver antenna at the focus being used. The same type reflector will be a great aid if used on the transmitter also. The reflectors also may be made from solid metal sheets. Considerable a.f. amplification should be used on the receiver, since it will usually be found to be quite "quiet," and at least two stages may be used.

PERFORMANCE

As yet, no distance work has been done by the author with this type of equipment, but when using a Mullard tube for the transmitter and a receiver using a Type '99 tube as described, "R9" signals could be obtained from one room to another. Other experimenters have been able to communicate up to 15 or 20 miles with this type of apparatus. With the aid of reflectors, the amateur should be able to work over a considerable distance on the 75-centimeter (¾-meter) band.

Strays

W5LB was caught using a 9-μfd. 2000-volt oil filter condenser on his receiver "B" eliminator. Seems that the receiver had developed a slight hum so the oil condenser was pressed into service as it was the only capacity immediately available. It is believed to have stood the gaff successfully.

[5] The low-frequency oscillator used in the 56-mc. receiver described by Hull, "'5-Meter' Receiver Progress," *QST*, July, 1931, would do nicely. — EDITOR.

Filament Supply for Two-Volt Tubes

The Air-Cell Type "A" Battery

By L. S. Fox, W2AHB*

THE air-cell type "A" battery is a high capacity, constant voltage, air-depolarized primary battery having electrical characteristics exactly matching the electrical requirements of the Type '30, '31, '32 and '33 2-volt tubes. These tubes and the battery were developed simultaneously as a part of a program resulting in a new and different type of battery-operated receiver. Since it has become the custom to classify battery receivers according to the kind of a battery used, "dry battery sets," "storage battery receivers," etc., it is logical and natural that these new receivers should become known as "air-cell" receivers.

The air-cell type "A" battery, originally produced for use exclusively in commercially manufactured broadcast receivers using Type '30, '31, '32, and '33 two-volt tubes, offers a promising solution of the "A" battery problem for amateur-built receivers using these tubes. There is danger of the conclusion, however, that the battery is useful for all purposes — which it decidedly is not. As the author points out in this article, it is strictly a single purpose battery, and unless it is used with a thorough appreciation of its limitations and characteristics, trouble and disappointment are sure to result. — Editor.

POLARIZATION AND DEPOLARIZATION

When current passes through the electrolyte of a battery a part of the electrolyte is dissociated into its constituent elements, one of which is hydrogen. The hydrogen ions travel toward the positive pole of the battery, where, unless promptly removed, they collect as gaseous hydrogen, which insulates the electrode from the electrolyte and rapidly reduces the voltage. This action is called polarization. To counteract this undesirable effect, various materials rich in oxygen are introduced into the battery, the oxygen combining with the hydrogen to form harmless water. Some of the depolarizing materials used are potassium bichromate, copper sulphate, copper oxide, lead peroxide and manganese dioxide. Thus, in order to depolarize batteries it has been necessary to put into them some potassium, chromium, copper, lead or manganese, elements which occupy valuable space in the batteries while contributing nothing to their output, but which are essential because of the oxygen associated with them. All these materials add to the cost of the battery, but the air we breathe is free and 20% of it consists of the desired depolarizer, oxygen. Air depolarization has the advantage of more ampere hours per dollar of cost and per cubic inch of volume. There is a further advantage, constant voltage, which makes the air-cell battery particularly adapted for radio work.

Air depolarization in the air-cell "A" battery is accomplished by a special form of carbon, used at the positive electrode, which has the unique ability to extract pure oxygen from air and to make it available within the battery as required. This unusual kind of carbon wants oxygen above all other things, and when exposed to a mixture of gases containing oxygen will load itself with this particular gas and vigorously repel the invasion of any other material seeking admission. Because of this property, the carbon, although extremely light and porous, will remain bone dry, even when immersed in the liquid electrolyte of the battery. It forms a perfect check valve, freely admitting oxygen to the interior of the battery, but blocking any flow of electrolyte in the reverse direction.

But — and this is a most important point — if the oxygen content of the carbon becomes exhausted in any manner, it will then proceed to load itself up with the next nearest thing, which in this case is the liquid electrolyte. When robbed of its oxygen, the carbon will soak up electrolyte just as a lump of sugar soaks up hot coffee, and, like the sugar lump, goes absolutely and thoroughly to pieces; disintegrates, rendering the battery useless. This harmful action will result from overloading the battery by drawing more current from it than it is able to generate with safety. The demand for oxygen is directly proportional to the current drain and the ability of the carbon electrode to extract oxygen from the air is limited. Consequently, excess current drains exhaust the oxygen supply and the carbon will soak up electrolyte and the battery will become useless.

The maximum rate at which the carbon can extract oxygen from the air corresponds to a current drain of only 0.65 ampere. Under no circumstances should the battery be subjected to a load in excess of this, as to do so will ruin the battery.[1] This limited output restricts the field of usefulness to the operation of receivers using 2-volt tubes, whose filament power requirements match the battery characteristics.

* National Carbon Co., 10 East 40th St., New York, N. Y.

[1] A fuse in the load circuit is suggested. — Editor

UNIQUE CONSTRUCTION

The battery consists of two cells, assembled in a one-piece moulded container and permanently connected in series. The dimensions are 13½ inches long, 6¾ inches wide, and 10 inches high, over all. In the dry state, the weight is about 25 pounds; filled with water and ready for service, about 37 pounds.

The electrodes are carbon and zinc in an electrolyte of sodium hydroxide (caustic soda or lye). The battery is manufactured and shipped dry.

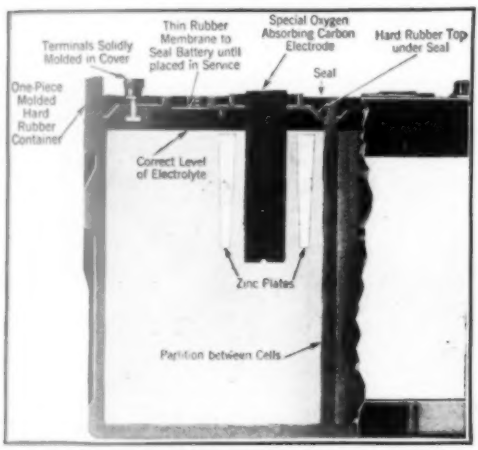

Terminals Solidly Molded in Cover
Thin Rubber Membrane to Seal Battery until placed in Service
Special Oxygen Absorbing Carbon Electrode
Hard Rubber Top under Seal
Seal
One-Piece Molded Hard Rubber Container
Correct Level of Electrolyte
Zinc Plates
Partition between Cells

FIG. 1.— CONSTRUCTIONAL VIEW OF THE AIR-CELL BATTERY

The electrolyte-forming chemicals are placed in the battery in solid form, and the battery is hermetically sealed to prevent the chemicals losing some of their strength due to possible contact with moist air. The seals are thin hard rubber membranes under the filler holes and cellophane seals over the tops of the carbon electrodes. Thus sealed, the battery is inert; no depreciation occurs; consequently the battery can be placed in service at the end of an elapsed time after manufacture and still deliver its full quota of 600 ampere hours.

To energize the battery for service, all that has to be done is to remove the cellophane covers from the electrodes, so that the depolarizing oxygen can enter, punch out the filler home membranes and fill both compartments with cold water. It takes about six quarts. Distilled water is not necessary; any water suitable for drinking purposes will do. The solid chemicals go into solution readily without stirring. As they dissolve the level of the liquid gradually drops and the dissolving process takes about four hours, although the battery is in condition to operate a receiver within an hour after filling. In view of this natural falling of the solution level, it is absolutely necessary that more water be added to the battery, not sooner than four hours after filling, to bring the solution to the correct level as shown by the indicating wire inside each cell. Otherwise, the battery may fail as a result of low solution.

If the solution is allowed to fall below the indicating wire directly beneath the filler hole, it will leave a section of the carbon electrode exposed to the moist air inside the battery, and failure may result due to the condensation of this moisture on the carbon. This condensed moisture will gradually penetrate into the carbon until it is no longer able to "breathe." If this happens, the battery will lose voltage and become useless. Therefore, the solution level should be inspected monthly and, if found low, brought up to the correct point by adding water. The monthly inspection will be often enough, because the only way moisture can be lost is through evaporation. It does not gas or bubble as does a storage battery, and, unless installed close to a heater, will not lose enough water in a month to do any harm.

Each filler cap has a small hole in it to permit free expansion and contraction of the air inside the battery as the temperature varies. If these holes should become plugged, the expanding air will cause a slight internal pressure which will actually force some of the solution into the pores of the carbon, which will cause it to wet up and disintegrate, just as though it had been overloaded or exposed to low solution. It is a characteristic of the solution that if exposed to air in small quantities and allowed to evaporate, large masses of hard white crystals will be formed. This being so, if any solution should slop up into the filler caps, the resulting formation of crystals is almost certain to plug the vent holes. Therefore, if an activated battery is moved about in any manner likely to slop the solution up into the filler caps, the caps must be thoroughly dried, inside and out.

OPERATING PRECAUTIONS

The solution should never be allowed to come in contact with clothing, rugs, furniture or the body. It will damage most textiles and wood finishes, and will produce painful burns on the body.

A cold air-cell battery is more easily overloaded than one having normal temperature. If the temperature goes low enough, the normal current consumption may become an overload and the battery will fail. This means that the battery should not be called upon to deliver current when the temperature is 40°*F.* or lower. Low temperature does not harm the battery, either before or after activation, so long as it remains idle while cold.

The cellophane covers must be removed. This may appear to be superfluous warning, but several batteries have failed because those activating them forgot to remove the cellophane covers. The purpose of the cellophane covers is to keep

the air out of the carbons before the battery is activated, to prevent loss of capacity. When in service the battery *must* breathe air through the carbon "lungs." If the cellophane covers are not

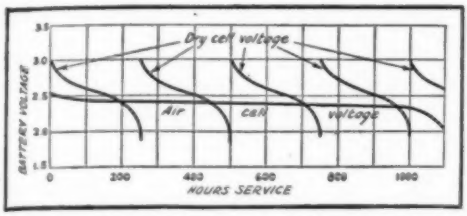


FIG. 2.—COMPARATIVE VOLTAGE CHARACTERISTICS OF THE AIR-CELL BATTERY AND DRY-CELL BATTERIES

used to supply the filaments of a 7-tube 2-volt receiver. Over four dry battery installations, each consisting of 8 standard cells connected in series-parallel, were exhausted in giving service equivalent to that obtainable from one air-cell battery.

removed the battery suffocates; the electrodes wet up and disintegrate from lack of oxygen, and the battery is ruined.

These five things: overload on the battery; low solution; plugged vent holes; operation at low temperatures, and failure to remove the cellophane covers are the only likely causes of battery failure.

Never test the battery with an ammeter across its terminals because this places a dead short circuit on the battery. The carbon electrodes will be stripped of their oxygen almost immediately and the battery will be useless.

The air-cell type "A" battery is a primary battery; it is not rechargeable. When exhausted, it is worthless and must be discarded. Fortunately its low cost and unusually long life make this a painless process.

This battery has been developed for the single purpose of supplying current to the filaments of 2-volt tubes. The battery and the tube have been designed to go together. As the characteristics of 2-volt tubes differ in several important respects from those of other tubes, the air-cell battery is not suitable for use with receivers employing other tubes. In exactly the same manner, the 2-volt tubes are not likely to give as satisfactory service with other types of batteries.

It is characteristic of all vacuum tubes that they demand a filament supply of practically constant voltage. The leeway between the upper safe limit above which seriously shortened life occurs, and the lower satisfactory operating limit below which the tube fails to function satisfactorily, usually is quite narrow. The familiar forms of primary batteries, such as the dry cell, are incapable of meeting this exacting demand for constant voltage, being inherently variable voltage devices. Fig. 2 illustrates graphically the wide range through which the voltage of a dry cell "A" varies during its useful life. It also serves to show the uniformity of the voltage delivered by the air-cell battery. Fig. 3 shows how the essential characteristics of the air-cell battery and the 2-volt tubes have been matched. The voltage delivered to the tube remains well within the narrow ideal operating range until the battery is practically exhausted.

Heretofore, the most economical battery receiver made was the so-called "dry battery" type. Fig. 2 shows that a 2-volt receiver can be operated from an air-cell battery for less than half of the cost from the most economical combination of dry cells.

RECEIVER DESIGN

The air-cell type receiver is a special kind of battery operated set, using 2-volt tubes in a filament circuit specially designed for operation from the air-cell battery. It has no manually adjustable rheostat like battery sets of old, because the voltage of the battery is so nearly constant throughout life that no adjustment of filament voltage is necessary. In place of the rheostat, the receiver has a fixed, non-adjustable resistor to reduce the battery voltage to the correct value for the filament. The design of this resistor must be extremely accurate. The voltage of a freshly activated battery is 2.53 volts and the voltage at the filament should be not less than 2.15 volts nor more than 2.20 volts. This is a quite narrow leeway. If the resistor is too small, the tubes will be "over-voltaged," and will have short life; if too large, the tubes will be "under-voltaged," and will cease functioning before the battery has had a chance to deliver its full rated life. It has been estimated that a resistor too large by .06 ohm would reduce the available service life of the battery by 25% to 30%.

Incidentally, there are now fourteen different commercial makes of air-cell receivers including short-wave receivers, at least one of which is well adapted to amateur band operation. Although the manufacturer does not guarantee the air-cell battery for use with home-built receivers, if proper precautions are taken no difficulty should be encountered.

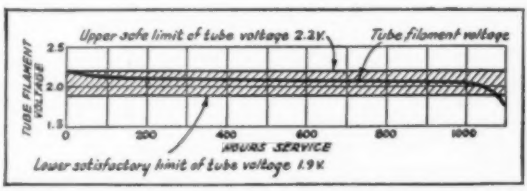


FIG. 3.—A RECORD OF THE VOLTAGE ACTUALLY DELIVERED TO THE FILAMENTS OF A 7-TUBE RECEIVER BY THE AIR-CELL "A" BATTERY

Filament current requirements of 2-volt tubes are as follows:

Tube	*Filament Current*
Type '30	.06 Amp.
Type '31	.13 Amp.
Type '32	.06 Amp.
Type '33	.26 Amp.

The proper rheostat sizes for various current drains are as follows:

Total Current	*Resistance*
.06 Amp.	6 Ohm
.12 Amp.	3 Ohm
.18 to .30 Amp.	2 Ohm
.36 to .65 Amp.	1 Ohm

With the proper rheostat correct filament voltage will be obtained. This should be measured at the *socket terminals* with an accurate voltmeter reading to .01 volt and with a new battery must fall between 2.15 and 2.20 volts. The rheostat should be inside the receiver — not on the panel — and once set should be left alone in order to obtain maximum battery and tube life.

ELECTION NOTICES

To all A.R.R.L. Members residing in the ATLANTIC, DAKOTA, DELTA, MIDWEST, PACIFIC (including Territory of Hawaii), and SOUTHEASTERN (including Porto Rico) Divisions of A.R.R.L.:

1. You are hereby notified that an election for an A.R.R.L. Director, for the term 1932–1933, is about to be held in each of the above Divisions, in accordance with the Constitution. Your attention is invited to Sec. 1 of Article IV of the Constitution, providing for the government of A.R.R.L. affairs by a Board of Directors; Sec. 2 of Article IV, defining their eligibility; and By-Laws 10 to 19 providing for their nomination and election. Copy of the Constitution and By-Laws will be mailed any member upon request.

2. Voting will take place between November 1 and December 20, 1931, on ballots which will be mailed from Headquarters in the first week of November. The ballots for each Division will list the names of all eligible candidates nominated for the position by A.R.R.L. members residing in that Division.

3. Nominating petitions are hereby solicited. Ten or more A.R.R.L. members residing in any one Division have the privilege of nominating any member of the League in that Division as a candidate for Director therefrom. The following form for nomination is suggested:

(*Place and date*)

Executive Committee,
American Radio Relay League,
West Hartford, Conn.

Gentlemen:

We, the undersigned members of the A.R.R.L. residing in the ..... Division, hereby nominate ....., of ....., as a candidate for Director from this Division for the 1932–1933 term.

(*Signatures and addresses*)

The signers must be League members in good standing. The nominee must be a League member in good standing and must be without commercial radio connections. His complete name and address should be given. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon of the first day of November, 1931. There is no limit on the number of petitions that may be filed, but no member shall append his signature to more than one such petition.

4. Present Directors from these Divisions are as follows: Atlantic, Dr. Eugene C. Woodruff, W8CMP, State College, Pa.; Dakota, Mr. Cy L. Barker, W9EGU, Henning, Minn.; Delta, Mr. M. M. Hill, W5EB, Natchitoches, La.; Midwest, Mr. H. W. Kerr, W9DZW-W9GP, Little Sioux, Ia., elected in November, 1930, to fill unexpired remainder of term of L. R. Huber, resigned; Pacific, Mr. Allen H. Babcock, W6ZD, Berkeley, Calif.; Southeastern, Mr. Harry F. Dobbs, W4ZA, Atlanta, Ga.

5. These elections are the constitutional opportunity for members to put the man of their choice in office as the representative of their Division. Members are urged to take the initiative and file nominating petitions immediately.

For the Board of Directors:
K. B. WARNER, *Secretary*

West Hartford, Conn., 15 July 1931.

To all A.R.R.L. Members residing in the DOMINION OF CANADA:

1. You are hereby notified that an election for an A.R.R.L. Canadian General Manager, for the term 1932–1933, is about to be held, in accordance with the Constitution. Your attention is invited to By-Law 29, defining the policy of the League in Canada; Sec. 1 of Article IV of the Constitution, providing for the government of A.R.R.L. affairs by a Board of Directors, of which the Canadian General Manager is a member; Sec. 2 of Article IV, defining the eligibility of Directors; By-Laws 26 and 27, specifying the duties and authority of the Canadian General Manager; and By-Laws 23, 24, 25 and 28, providing for his nomination and election. Copy of the Constitution and By-Laws will be mailed any member upon request.

2. Voting will take place between November 1 and December 20, 1931, on ballots which will be mailed from Headquarters in the first week of November. The ballot will list the names of all eligible candidates nominated for the position by League members residing in Canada.

3. Nominating petitions are hereby solicited. Ten or more A.R.R.L. members residing in the

(*Continued on page 86*)

The Standard Frequency Transmitter at WIXP

The 500-Watt Power Amplifier*

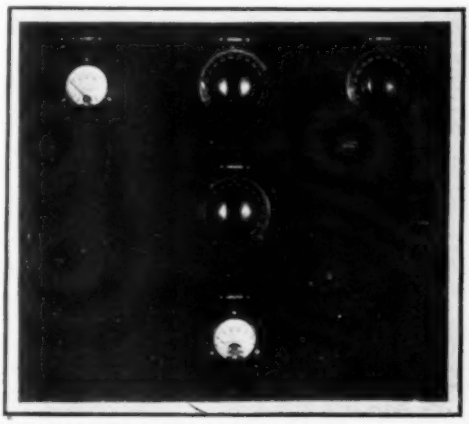
In Two Parts—Part II

By Paul S. Hendricks, WIAXV–WIXP**

IN the interest of simplicity and reliability it was thought desirable to have the output power amplifier consist of a single air-cooled power tube of the desired rating. At the time that this unit was designed the screen-grid Type '61 was practically the only 500-watt air-cooled tube available for high-frequency work. Therefore this type of tube was adopted as the final amplifier. As was noted in the first part of this article, it is contained in an entirely separate unit from the exciter.

The input circuit is arranged so that it may be coupled inductively or capacitively to the source of excitation. The capacitive coupling is the more convenient to use because generally it is not necessary to make any changes in the coupling even when the operating frequency is shifted considerably. However, the capacitive coupling involves shunt feed of the grid bias which presents difficulties because of the necessity of employing a very effective radio frequency choke. Because it is often difficult to construct a good radio frequency choke for high-frequency operation, it is generally desirable to use inductive coupling with its attendant adjustments, in order that the grid bias may be series fed, which arrangement does not require the choke to operate as effectively and thereby avoids some difficulties. In the diagram, Fig. 2, the input circuit is shown arranged to be fed inductively corresponding to the arrangement of the exciter output circuit shown in Fig. 1 of Part I. If P_3 is placed in its alternate position and the jumper H_2 substituted for the blocking capacitor C_{18}, it is ready for capacitive coupling. The capacitor C_{18} might be connected permanently in the circuit, but it has been found when using inductive coupling that it is sometimes desirable to series-tune the input circuit. In this manner it is possible to obtain a greater voltage across the input of the tube at the higher frequencies. In this case a value of 100 $\mu\mu$fd. for C_{18} is used when operation is in the vicinity of 14,000 kc. It would be desirable to plug a variable capacitor in place of the fixed unit if it were necessary to tune over a band of frequencies greater than a few hundred kilocycles.

The output tank inductor of this amplifier is wound with ¼-inch diameter copper tubing and is connected across a capacitor of 125 $\mu\mu$fd. The ratio of inductance to capacity is rather large, so that the circulating current is not sufficient to cause excessive heating of the ¼-inch tubing when the amplifier is properly coupled to its load circuit. The tank circuit capacitor is of the type which has two separately insulated stators and a balanced rotor. The capacitance of each section is



THE FRONT PANEL OF THE POWER-AMPLIFIER UNIT MATCHES THAT OF THE EXCITATION UNIT DESCRIBED IN THE FIRST PART OF THIS ARTICLE

250 $\mu\mu$fd. and each has a breakdown potential rating of 3500 volts. By connecting the capacitor so that the two sections are in series in the circuit, a capacitance of 125 $\mu\mu$fd. is obtained with a break down potential rating of 7000 volts.

The keying of this transmitter is accomplished by the well-known grid-blocking arrangement whereby the grid bias is raised sufficiently when the key is up to prevent the exciting voltage from causing any plate current to flow. This requires a rather high keying bias potential, in this case over 1000 volts. It is, however, a very satisfactory method. Keying somewhere in the exciter unit circuits could be accomplished when the exciter is being crystal controlled but when the exciter is self controlled, with only one stage between the oscillator and the load, there is no satisfactory place to key the exciter without causing undesirable frequency shifts. With the coupling and the keying system just described it is possible

* Contribution from Round Hill Research, Massachusetts Inst. of Technology. Part I appeared last month.

** Round Hill, South Dartmouth, Mass.

to key the amplifier at full power, with complete cut-off when the key is up and without causing any frequency change whatever in the self-controlled oscillator.

Since a very slight change in adjustment may introduce a frequency "flip" of as much as 200 cycles, great care must be taken in tuning the transmitter. For operation in the vicinity of 3500 and 7000 kc. the adjustments for zero frequency shift are easy to obtain when using the capacitive coupling; but for 14,000-kc. operation this can be accomplished more readily when employing the inductive coupling system.

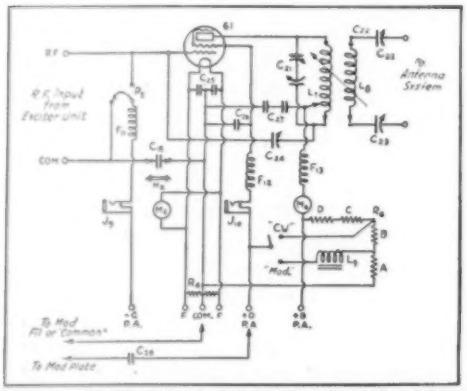


FIG. 2 — SCHEMATIC CIRCUIT OF THE POWER AMPLIFIER, SHOWING CONNECTIONS FOR 'PHONE TRANSMISSION

L_7, L_8 — See Inductor Specification Table.
L_9 — Screen-grid modulation reactor, 30 henries; Samson Type 3f2.
C_{21} — Double-section tank capacitor, 125-μμfd. General Radio Type 334-Z. See text for details.
C_{22}, C_{23} — 150-μμfd. 3000-volt National Type TM-150.
C_{24} — Neutralizing capacitor, 8.0-μμfd. 10,000-volt rating.
C_{25} — .01-μfd. receiving type mica capacitors.
C_{26}, C_{27} — .002-μfd. 5000-volt mica transmitting type capacitors.
C_{28} — Audio coupling capacitor, 4-μfd. 1000-volt filter type.
F_{11-13} — Radio-frequency chokes. See text.
R_6 — High-potential voltage divider. A, 5000 ohms; B, 25,000 ohms; C and D, 20,000 ohms each. All resistors are 85-watt non-inductive type.
J_9, J_{10} — Grid- and screen-grid milliammeter jacks.
M_3 — 0–15 a.c. voltmeter.
M_4 — 0–500 d.c. milliammeter.

When this amplifier was first put into operation it was noticed that with the key up a small amount of energy still appeared in the output circuit, even when the plate voltage of the amplifier was removed. Because no precautions were taken to shield the amplifier input from its output circuits, other than careful arrangement of the apparatus and wiring, it was suspected that there was sufficient stray coupling to allow some of the exciting energy to reach the output circuit. However, investigation showed that only about half of the stray energy was caused by stray coupling and that the rest was because the screen element within the tube does not completely neutralize the grid-to-plate capacitance. In order to completely isolate the input and output circuits of this amplifier it was necessary to provide a neutralizing circuit. This neutralizing circuit is composed of a very small variable capacitor, C_{24}, and the small portion of the tank inductor, L_7, below the filament tap. The capacitor has a maximum value of about 8 μμfd., with its plates spaced ¼-inch. This amount of spacing is necessary to prevent breakdown because the total grid voltage plus plate voltage exists across it. The neutralizing portion of the tank inductor is not more than about 10 percent of the total inductance. This neutralizing adjustment is quite critical because of the small values concerned. The amplifier may be used without the neutralizing circuit but at receiving locations where the signal is heard with high audibility a "back wave" may be noticed.

In order to provide a flexible arrangement for coupling the output of the amplifier to its load circuit there has been provided the coupling coil L_8, on an adjustable mounting, and the two variable capacitors C_{22} and C_{23}. The capacitors have a maximum value of 150 μμfd. each. With these devices practically any type of antenna or feeder system may be coupled satisfactorily. For a two-wire current- or voltage-feed line the capacitors go one on each side of the coupling coil, in series with the line, for a series-tuned system; or with the coupling coil connected directly to the line and the capacitors across it for parallel tuned systems. For a two-wire matched impedance (untuned) line[3] the capacitors may be connected in series or in parallel across the coupling coil to form a tank circuit, with the feeders connected across a portion of the coil. A single-wire feeder may be tapped directly onto the tank inductor, with one or both of the capacitors connected in series with the line to keep the plate voltage off the antenna system. With this arrangement it should be noted that it is essential to ground the low potential side of the amplifier tank circuit. Also, such a single-wire feed line may be tapped on the inductor of a tuned circuit coupled to the amplifier tank as was just mentioned in connection with a two-wire line. The series capacitor to keep the plate potential off the antenna then will not be necessary. An inductively coupled antenna and ground system may be used also, of course.

POWER AMPLIFIER CONSTRUCTION

This amplifier unit has the same overall dimensions as the exciter unit. It is 24 inches wide, 21 inches high and 18 inches deep. The framework is built with 1" x 1" whitewood pieces and has a deck ½-inch thick of the same material. It is finished with walnut stain and shellac, similar to the finish of the woodwork on the exciter unit. The front panel is composed of three sections of black bakelite which are each 24 inches wide, 7 inches high and $\frac{3}{16}$-inch thick, and corresponds

[3] Houldson, "The Doublet Antenna," *QST*, Dec., 1930.

to the panel of the exciter unit. The general layout is shown by the three photos.

In the panel view, the meter at the upper left indicates the filament voltage and that at the lower center the plate current. The two dials at the top operate the output circuit capacitors C_{22} and C_{23}. Since these photos were taken the left-hand one of these capacitors has been moved into the vacant space below the right-hand capacitor. This was found desirable because the original location at the upper center was rather close to the filament of the tube and the low potential circuits, so that it caused some stray coupling. The center dial operates the tank circuit capacitor C_{21}.

In the view from the rear, looking slightly downward, the amplifier tube appears at the right with its tank circuit capacitor to the left, at the center of the photo, and its tank circuit inductor just above it. The output coupling inductor, on its adjustable slide mounting, is on the shelf at the upper left. Just above the tank and coupling inductors and partly hidden by the framework at the top may be seen the backs of the output circuit capacitors. Below the shelf, on the baseboard, are the resistors of the voltage divider for the screen-grid supply. In front of this is the modulation reactor. The filament, plate and screen-grid terminals and the screen-grid circuit jack are on the terminal panel at the lower right. The input or grid-circuit terminals and jack are on another small terminal panel at the lower front of the left side, away from the rest of the circuits. This latter panel unfortunately does not appear in any of the photos. The neutralizing capacitor was not in place when the photos were taken but it is mounted on the baseboard directly below the tank circuit capacitor. The right-side view of the unit shows the same things as the rear view but helps to give a better idea of their actual location.

POWER-AMPLIFIER INDUCTOR SPECIFICATIONS

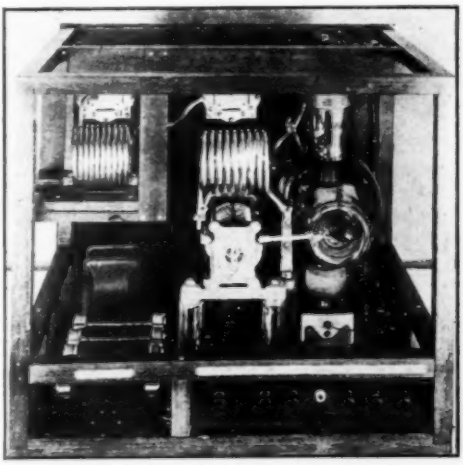
Inductor	*Freq. Band, Kc.*	*No. Turns*	*Outside Diam., Inches*	*Length, Inches*
L_7	3500	24	3 3/4	7 1/8
	7000	11	3 3/4	4 1/2
	14,000	5	3 3/4	2 3/4
L_8	3500	15	3 3/4	5 1/2
	7000	Same as for 3500 kc.		
	14,000	10	3 3/4	3 5/8

1/4-inch copper tubing is used for all inductors. Constructional details are given in the text.

RADIO-FREQUENCY CHOKES

It is practically impossible to design a radio frequency choke which is satisfactory over a frequency range as great as is covered by this transmitter. The chokes were made readily interchangeable, therefore, by fitting them with plugs and supplying jack mountings. In addition to the radio-frequency chokes within the units, as indicated in Figs. 1 and 2, it was found necessary to put radio frequency chokes in every power lead external to the unit. These chokes are connected in the power leads just before the leads attach to the binding posts on the unit.

Except for the optional arrangement at the input of the power amplifier unit, it was necessary to make all the grid-bias feeds in shunt because capacitive coupling is used between stages. Three different sizes of radio-frequency chokes are necessary for these grid circuits in order to cover the desired frequency range satisfactorily. The plate power is series-fed through the tank inductors so that the radio-frequency chokes are connected to a low potential point of the circuit and therefore need not be as effective as the grid chokes. The screen-grid circuits are normally by-passed to the common or low side of the circuit, so that their chokes are not likely to cause trouble.



THE 500-WATT AMPLIFIER FROM THE REAR

The arrangement of the components is detailed in the text.

The requirements of the chokes in the external circuits are likewise not as exacting as those in the shunt-fed grid circuits. It was found generally satisfactory to use in all of the circuits, excepting the shunt fed grid circuits, chokes which are designed to be most effective at the low or intermediate frequencies covered by this transmitter. The most satisfactory type of choke tried is one which is wound with a single layer of wire on a round wooden dowel. The ones now in use are wound on 1/2-inch dowels which have been protected against excessive absorption of moisture by boiling them in paraffin until they are thoroughly impregnated. They are 4 1/2 inches long with the connecting plugs spaced 4 inches between centers. One-half inch is allowed at each end for the plugs and soldering lugs, thus leaving a space of 3 1/2-

inches for the windings. The windings are of No. 34 silk-enamel wire, there being no spacing between the turns except for the first half-inch at the end which attaches to the high-potential radio-frequency side of the circuit, where the turns are spaced about twice the diameter of the wire.

The approximate number of turns required for the three sizes of chokes which are necessary for the grid circuits are as follows: 14,000 kilocycles, 90 turns; 7,000 kilocycles, 300 turns; 3,500 kilocycles, 600 turns. Since the forms are not long enough to take 600 turns in a single layer, some of the forms are provided with a slot near the low-potential end, 3/32 inch deep and 1¼ inches long, into which part of the required number of turns may be scramble-wound. The method of winding these chokes is to start off by winding the first half-inch spaced, then winding the turns close until the slot is reached, after which the rest of the turns are scramble-wound until the required number is attained.

The filament circuit chokes are wound with two strands No. 12 enameled wire in parallel on a ¾-inch diameter fiber rod. The strands are not connected in parallel but one goes in series with each lead of the filament line. There are thirty turns in series with each line or a total of sixty turns along the length of the rod. One of these double chokes is used in series with the filament line to each of the two units of this transmitter.

AMPLIFIER UNIT POWER SUPPLY

The filament supply for the amplifier is obtained from either a direct-current generator or a 60-cycle transformer. These supplies are the same ones that feed the exciter unit. A center-tapped resistor across the filament supply, to provide a direct-current return path for the grid, screen-grid and plate currents, makes it unnecessary to change any connections when the source of filament supply is changed. The plate power is obtained from a 3000-volt rectifier-filter supply unit. Across this supply is connected the voltage divider, R_6, which is provided with the proper taps to furnish the necessary screen grid power.

The operating grid bias of about 250 volts is obtained from a bank of "B" type dry cell batteries, similar to those used on the exciter unit, but independent of them. The keying bias is furnished by several receiving type rectifier-filter supply units connected in series. These units need supply only a small amount of current as there is not much loss in the grid circuit when the tube is blocked to cut off the plate current.

'PHONE TRANSMISSION

It is possible to obtain fairly good quality 'phone transmission by modulating the screen grid of a four-element tube, such as the Type '61, in the same manner as the plate of a three-element tube is usually modulated. The method is what is generally known as the constant-current system, applied to the screen-grid circuit. A swing of only about 200–300 volts of audio frequency is required. In addition to the source of audio frequency the only equipment added to the amplifier to modulate it is the reactor L_9, and the switch which changes the tap on the voltage divider R_4 to the necessary lower value. With this system of modulation it is possible to obtain a carrier output of approximately one quarter of the normal rating of the tube. This means an average carrier of 125 watts with the peaks running up to 500 watts. This amount of output, although small compared to the output for continuous-wave telegraph operation, may, however, be very useful on certain occasions.

The method of adjusting the amplifier for 'phone transmission is to couple the source of modulation giving, say, 250 volts swing to the screen of the tube and then reduce the screen voltage, thus reducing the carrier output, until the percentage of modulation is high while the quality of the signal is good. These conditions may be checked roughly by listening on a non-oscillating monitor and watching the radio-frequency output current meter. The output current usually decreases or "talks down" when modulation is applied if the screen voltage is too high. As the screen voltage is decreased and approaches the proper value the output current will begin to "talk up." When everything is properly adjusted the output current should talk up to about 22 percent above the steady non-modulated value.

The audio signal voltage for the scheme just described is obtained at this station from the modulating system of a small radiophone transmitter which has an output of 50 watts. This latter transmitter was described in a recent article.[4] The audio-frequency signal from the modulator of the above transmitter is fed to the screen grid of the power amplifier by connecting the "common" or filament sides of the two systems together and then connecting the screen grid of the power amplifier to the plates of the modulators via the coupling capacitor C_{28}, as indicated in Fig. 2.

MISCELLANEOUS DETAILS

All of the copper tubing inductors used in this transmitter were first polished then given a coat of clear lacquer. This helps to keep the radio-frequency resistance low by preventing them from tarnishing and also keeps them looking clean and neat. These inductors are connected directly across their respective tank capacitors by means of heavy brass brackets which are firmly fastened to the capacitors. The brackets are provided with 10/24 brass bolts and wing nuts which make a good electrical connection and hold the inductors

[4] Chinn and Hendricks, "A Modern 50-Watt Radiophone Transmitter," *QST*, Nov., 1930, particularly Fig. 3, page 24.

rigidly in place. The filament and excitation taps on the oscillator, buffer-amplifier and power-amplifier stages are made by means of spring clips, which attach to the small pieces of No. 12 wire that are soldered to the proper points on the various inductors. The grid and plate connections on the oscillator and buffer amplifier tubes are also made by means of the same type clips. These clips are quite satisfactory where large currents are not being carried. These together with the wing nuts and bolts for the inductors make it possible to change the tubes and frequency ranges easily and quickly.

All of the tank circuit capacitors have been fitted with Crolite, a special moulded ceramic insulation, instead of the hard rubber insulation with which they were originally fitted, because trouble has been experienced with the latter insulation at high frequencies. These special insulators can be supplied by the manufacturer of the capacitors at a cost slightly above the regular price.

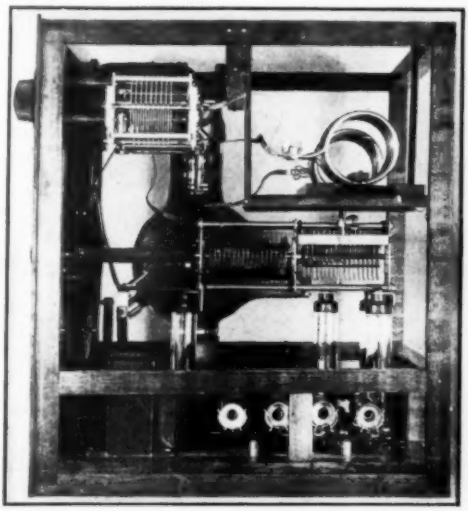
All of the insulated extension shafts which connect the dials with the variable capacitors are made of ¾-inch diameter fiber rod. These rods are very firmly fastened to both the capacitor and the dial shafts by means of brass machine screws which are threaded straight through both the rods and the shafts. The use of such large diameter rods was found necessary as "backlash" is noticeable on smaller diameter shafts even though they are not more than two inches long. The pinning of the shafts is also essential because set-screws cannot be depended on.

One of the important things in designing a high-frequency transmitter is to arrange the various pieces of apparatus so that the wiring may be made as short and direct as possible, to avoid stray coupling between the various circuits. That attention has been given to this matter may be observed by examining the photos. All connections in the radio-frequency circuits are made by means of heavy copper strip, ribbon or wire. The various power circuits are connected with three different sizes of stranded "automotive" wire. The filament circuits have No. 10 and the grid bias circuits No. 16 wire, with a light rubber insulation. The plate and screen-grid circuits have No. 18 wire with a heavy rubber insulation. All of these wires have a very tough outer covering of varnished braid which is not likely to be damaged by running the wires through holes in the metal shielding.

The voltage dividers, two of which are used in the exciter unit and one in the power amplifier unit, are all composed of the same type of resistor having a dissipation rating of 85 watts. These resistors are provided with ferrules which fit into a standard size fuse clip. Their dimensions are 1 inch in diameter and 5½ inches long, over-all.

The auxiliary equipment such as grid bias supplies, keying relays, resistors and the like are located on a shelf below the table on which the transmitter is installed. The plate and filament supplies are in another room and lines from them are brought to the transmitter via grounded conduit and BX, so that there is little chance of stray radio frequency reaching them and causing trouble, or that they will provide a path for stray radio frequency between units.

Sponge rubber is used underneath the two units of the transmitter, the cooling fan and the keying



THE AMPLIFIER FROM ITS RIGHT SIDE

relay in order to prevent disturbances due to vibration. A very small amount of vibration would affect the oscillator, causing the signal to have a bad flutter.

When this transmitter is used for two-way communication it is often desirable to stop the oscillator quickly without shutting down the whole power supply, because the oscillator will interfere with reception at or near the frequency on which it is operating. For this purpose a relay and control circuit has been provided, arranged to raise the oscillator grid bias to a point where the tube does not oscillate. The same switch which operates this relay also operates the relay which starts the oscillator cooling fan mentioned previously.

This transmitter can be very easily and quickly shifted from one frequency to the next during the transmission of a standard frequency schedule as has been demonstrated by several months use. The settings for the various points are determined before each schedule and unless the user of the signals has a calibrated receiver, it will take longer to find the signal than it takes to shift the transmitter frequency.

In conclusion, it is hoped that this article will

(*Continued on page 90*)

When News Breaks—What to Do With It

AN earthquake in New Zealand — another in Nicaragua — sealer *Viking* explodes off the Newfoundland coast — Boy Scouts quarantined on an island — a motorship in open sea sends a "40 meter" SOS — the Statue of Liberty's telephone wires break . . . and everywhere streaming headlines blacken newspaper pulp with news sent by radio amateurs on the scene to other amateurs in the outer world.

Dozens of times last winter, and on many more occasions in years past, circumstance selected some quiet amateur doing his normal, regular operating and flung him into history with the breaking of some emergency, some tragedy, some event of tremendous news importance which he alone could handle for the press services waiting to feed the news hunger of an avid world.

News and messages to be sent through; messages that he knew well enough how to handle — but what about the news? What should he do with it? Picture yourself in that position. It may be actual fact some one of these days. Would you know what to do? To a few, procedure in handling news received over the air will be familiar, but to the majority a few suggestions probably will be helpful.

IF SOMETHING HAPPENS . . .

First of all, remember the terms of your operator's license — the oath of secrecy which forbids your divulging the contents of any message received through the operation of your equipment except to the addressee of the message. Don't copy anything blind out of the air and phone it to your local newspaper, particularly in the case of an expedition. Most of that material has been bought and paid for, and will be duly copyrighted upon receipt. However, if you have been in two-way contact with the expedition, even if the traffic handled is in itself confidential, the mere fact of your working the station usually has news value. Your local paper should be told of this, together with any interesting private or "aside" remarks made by the operator while in communication with you.

But when a press message is received for immediate general release, do not lose any time in telephoning the full facts to the recognized news agencies in your vicinity. If a branch of any of the great news services (AP, UP, INS, etc.) is near, give them the first word. Then tell it to your local papers. If no branches can be reached, make sure that at least one member-newspaper of both UP and AP is informed, with the request that the news be put on the wire.

Release your information in this manner: Give your name, your station, the fact that you are a radio amateur and an A.R.R.L. membe and reserving a credit line to that effect, th source of your news, the news itself in brief bu complete form, and the authority on which it i based. Get an acknowledgment, give any wante repeats, and then go back to the set for mor news.

Just what is news, of all that you hear over th air? Usually it is in emergency work that ama teurs can be of greatest assistance to the news gathering agencies. The unexpected crisis may b merely a serio-comic yachting escapade, yet i might be a nation torn from its foundations by a mighty earthquake — yours, the job to stand by for messages and news. Expeditions news i always highly interesting and often exclusive t the station being worked. Unless directed ex pressly to some news service or paper, it can usually be given general distribution. A remarkable contact or piece of work you have yourself accomplished might be news — in which case, let us know about it, too. Anything unusual, out of the ordinary, and apparently exclusive, is at least worth a telephone call to the telegraph editor (or city editor, if local news) of the home newspaper office.

That is, briefly and generally, the way to discharge your duty to the cause of national amateur publicity and public good will when news concerning any event of national importance somehow lands (right side up, we hope) in your shack.

. . . AND LOCALLY . . .

On the local side there is another job of work to be done. Local publicity can best be handled through affiliated clubs, and every one of these is urged to elect a publicity officer who should immediately get in touch with his local newspapers, and investigate the possibilities of regular and feature stories and stunts. There are three things he can arrange: (1)A large Sunday edition page or two-page spread, dealing with local amateur stations and activities, and well illustrated with pictures of these stations. Contact the Sunday feature editor, pointing out the importance of amateur radio and the things you are doing. (2) A regular weekly radio column dealing with the activities of local amateurs. This would probably appear on the radio page, and should be inaugurated through the radio editor. (3) Occasional news items and bulletins concerning local work to be given radio and city editors. If the second plan seems impractical in your locality, this last procedure is especially suggested. Finally, the publicity officer should also contact Headquarters for assistance in his problem of securing local publicity.

THEN . . .

Concluding, we would like to suggest that amateurs generally would be rendering a real service to their A.R.R.L. if they would constitute themselves an informal press-clipping personnel, and send in to us the items on amateur radio they may notice in their local papers; not only pieces which appear to be purely publicity in either generation or subject matter, but unfavorable editorials, accounts of contemplated anti-amateur ordinances, and similar important if not gratifying topics. Such a service will be invaluable in aiding our realization of the general status of amateur radio with respect to the national press.

— *C. B. D.*

Roanoke Division Convention

Winston-Salem, North Carolina, September 25th and 26th

THE Robert E. Lee Hotel has been chosen as the headquarters for the A.R.R.L. annual convention of the Roanoke Division at Winston-Salem, N. C., to be held under the auspices of the Winston-Salem Amateur Radio Club, Friday and Saturday, September 25th and 26th. A cordial invitation is extended to all amateurs within driving distance to attend this yearly affair.

The committee has worked hard to prepare a program that will be interesting — the success of the convention depends on your attendance, so come along and enjoy two days of good fellowship, which will be topped off by a real banquet such as southern chefs know how to prepare. Special trips, theatre parties, contests, technical sessions with good speakers such as Director Gravely, Dr. E. C. Woodruff, Miss Zandonini of the Bureau of Standards, and many others. A.R.R.L. will be represented by A. A. Hebert, Treasurer-Fieldman.

The registration fee is $4.00 and a special price of $2.50 for the XYL's and YL's. Bring them along. Further information may be obtained from A. L. Hege, Box 1815, Winston-Salem, N. C.

Vanalta Division Convention

Vancouver, British Columbia, September 5th and 6th

THE British Columbia Amateur Radio Association is sponsoring the convention this year, and extends a cordial invitation to all amateurs in this division and visitors from other provinces and the states to spend Saturday and Sunday, September 5th and 6th, amongst us to attend the annual convention. Everyone will be entertained royally. Details of the affair are not complete at the writing of this announcement. Write to Wm. J. Rowan, Convention Committee, 2961 East 5th Ave., Vancouver, B. C., for further information.

A New Headset

IF THIS were 1921 instead of 1931 a new brand of headphones would cause little stir, but in this era of loud-speakers the introduction of a new headset is an event too unusual to pass unnoticed. It's especially worthy of amateur attention because this particular headset is a real featherweight outfit — the complete set, including cord and headband, weighs only four ounces.

The new headset, manufactured by the Trimm Radio Manufacturing Company, Chicago, Ill., is illustrated in the accompanying photograph. The 'phones are almost unbelievably small and light in weight, and can be worn for hours without causing any discomfort or weariness. They are as sensitive to weak signals as headsets ordinarily

used in amateur stations, but do not handle the very loud signals as well, since they are not designed to work as loud-speakers. The headband shown in the photograph is not adjustable and it is expected that an improved type of headband will be worked out in the near future.

Strays

THE HAM'S PRAYER

O Lord, suffer me to work
Such long DX, that even I
When talking of it afterwards
Shall have no need to lie!

—*W?VP*

Plastic wood can be used to fill holes in old bakelite panels. With a little paint on the spots the panel looks as good as new.

— *Ray Howe, Red Wing, Minn.*

The Frequency Measuring Test

EVERYONE invited to take part—3.5 and 7 m.c. to be used—dates, October 24th and 31st (Saturdays)—mark your calendar *now*—start checking W1XP, W9XAN and W6XK on the Regular S.F. Transmissions.

Everything is in readiness for our first A.R.R.L. Frequency Measuring Test which received preliminary announcement in July and August *QST*. A receiver and a frequency meter will be all the equipment necessary for anyone who wishes to take part; and where will we find any 1931 amateur station without both? Selected transmitting stations will send on schedule for measurement purposes on each of the dates mentioned above. All that any amateur has to do to take part is to tune in for these stations, measure the frequency as accurately as possible, and report to A.R.R.L.

THE RADIO DIVISION COÖPERATES

The Radio Division, Department of Commerce has signified its willingness to coöperate to the fullest extent possible in making official measurements at the different Radio Division monitoring stations on each of the transmitting stations that will be designated to send in this test. The individual sending stations will each have tested with one of the nearby monitoring stations before the dates of the test so all will be in readiness for the event. The splendid and unreserved coöperation of the Director of Radio and Radio Supervisors with the sending stations should assure that this test goes off perfectly.

CERTIFICATES

Every contestant has the opportunity to win one of the Certificates of Accuracy that will be issued to those who measure the official test signals within the prescribed reasonable degree of accuracy. The frequency measurements reported by those taking part will be compared by A.R.R.L. Headquarters with the official measurements on the same transmitting station made at the same time by the government monitoring stations. The degree of accuracy of measurement attained by each entrant in the test will be specified on his certificate. In addition we plan to present an Honor Roll in *QST* with the results of the activity and credit for the worthy who take part and report.

WHO MUST ENTER

While *everyone* is invited to take part, participation in this test is regarded as a *duty* of one particular A.R.R.L. group, the Official Observers. The test will show very many operators who are proficient in frequency measurement work, and each and every Official Observer must show his qualifications by participation or be recommended by his S.C.M. for replacement by better-qualified men who show merit and availability for appointment as O.O. for the 1931–1932 season. Every O.R.S. appointee will take part in this activity as a matter of course, too, and will be expected to report promptly or give a good excuse for failure to do so. The test while designed particularly for United States and Canadian members is open to amateurs of any country who are able to take part at the hours that will be mentioned. YOU are cordially invited to take part and make the most of this opportunity. Not only are you assured a pleasant and profitable experience through the test, but also participation is a form of insurance against the likelihood of off-frequency operation and the unpleasant consequences that follow to amateur radio as a whole as well as to you individually.

OFFICIAL TRANSMITTING STATIONS

Transmitting stations are being selected depending on their power, frequency stability, geographical location and the like; crystal control and a d.c. note being specified as requirements. Crystal-controlled stations having a temperature-controlled oven as well as really low oscillator plate voltage have been given preference over others, since frequency drift must be avoided insofar as possible, and the only way other stations can even approximate such frequency stability is by recourse to a long "warming-up" period of several hours duration just in advance of the "test."

The final station line-up cannot be given in this issue since correspondence is still in progress but a skeleton arrangement of the schedule that we shall try to fill is given here with the procedure these stations will use; so by following this schedule on the dates of October 24th and 31st anyone will be able to pick up the transmissions and take part fully, without further information. Special crystals will be lent to participating stations for use in this test. *The transmissions will be arranged to start in the eastern time zone at nine p.m. E.S.T. proceeding progressively west, so that transmissions in the Central, Mountain, and Pacific Standard Time zones will each start at nine p.m. local standard time.* There will be no two transmissions taking place at the same time. During the first half of each hour there will probably be two different transmissions somewhere in the 3500-kc. band; and in the second half hour of each hour two transmissions in the 7000-kc. band. At this writing the following are being considered as official transmitting stations:

W1ASY, W1AXV, W1MK, W6AM, W6CUH, W6EGH, W7AAT, W8DMS, W8GU, W9DFR, W9FFD, W9UZ and W9GY with additional qualified stations yet to be heard from.

You are not expected to measure all the stations that transmit. The time, frequency, skip distance, and effects due to conditions may prevent reception of some stations altogether. It is appreciated that the more stations you can measure the better the results will average and so we are attempting to have enough transmissions each evening of the test to cover the country thoroughly. A report on measurements of not less than two separate test transmissions, which may be made on either one or both dates (at any time at all during the test), will be sufficient to enter you. The following table will serve as a guide in listening-in to pick up the official stations to be measured. Each frequency will be used for just 15 minutes.

PROCEDURE

Each test transmission will be divided into five-minute periods. The transmitting stations will each send "QST" and sign their identifying call signal for exactly three and one-half minutes. During the next one and one-half minutes three 30-second dashes will be sent. *This last period is the one in which all frequency measurements should be made.* This procedure will be repeated completely, three times in all, during fifteen minutes of each schedule, making it possible to get three different readings of frequency, which you should designate in your report as (1), (2) or (3) so we can check against the proper official measurement of the Radio Division. Remember, the "QST" is sent to enable listeners to find the station; the long dashes to enable accurate settings for frequency measurements.

FORM FOR REPORT

Special log forms will be mailed in advance to all who request them by a postal card, note or message to A.R.R.L. Headquarters. It is not necessary to obtain these forms, but if you make up your own report, the following form is required. Use letter size paper (8½"x11" approx.) ruling off columns as indicated.

FREQUENCY MEASURING TEST

From..... (name) ..... (call)

..... (street and number) I use { Phone / CW (check one or both)

..... (city and state)

Transmitting Station	*Time (Local St'd)*	*Frequency Meter Dial Setting*	*Frequency*	*Do Not Write in This Space*

PREPAREDNESS

The way to be ready for the Frequency Measurement Test is to obtain a frequency meter if you do not already have one, calibrate it from standard frequency transmissions as many times as you possibly can and use it at every opportunity, to get practice and keep your meter "right on the dot." Frequency meters such as the dynatron type described in *QST* and in the *Radio Amateur's Handbook* are recommended, and several references to articles containing constructional information were given last month (page 14, August, 1931, *QST*). Right now is the time to make those weekly calibrations from W1XP, W9XAN, or W6XK S.F. transmissions; also to replace batteries on dynatron or heterodyne-types of meters if a check indicates such attention is necessary. Of course using the weekly calibration transmissions should be a habit with every amateur. Now is the time to start checking to get in practice and to learn any special corrections your meter should have due to room temperature or "warming up" characteristics. Summer and fall too are rebuilding time and any station not equipped can obtain necessary parts and have ample time to get ready for the test. The certificate winners in this test which will open our 1931–1932 season will be the operators who start regular checking of meters early, so lose no time.

One final word: The transmitting stations will adhere closely to the time schedule and all opera-

Time Zone of Sending Stations	*Frequency Band (look for "QST")*	*Time (Oct. 24th and 31st — p.m.)* E.S.T.	C.S.T.	M.S.T.	P.S.T.	*Greenwich Time (Oct. 26th and Nov. 1st)*
E.S.T.	3500	9:00– 9:15	8:00– 8:15	7:00– 7:15	6:00– 6:15	0200–0215
	3500	9:15– 9:30	8:15– 8:30	7:15– 7:30	6:15– 6:30	0215–0230
	7000	9:30– 9:45	8:30– 8:45	7:30– 7:45	6:30– 6:45	0230–0245
	7000	9:45–10:00	8:45– 9:00	7:45– 8:00	6:45– 7:00	0245–0300
C.S.T.	3500	10:00–10:15	9:00– 9:15	8:00– 8:15	7:00– 7:15	0300–0315
	3500	10:15–10:30	9:15– 9:30	8:15– 8:30	7:15– 7:30	0315–0330
	7000	10:30–10:45	9:30– 9:45	8:30– 8:45	7:30– 7:45	0330–0345
	7000	10:45–11:00	9:45–10:00	8:45– 9:00	7:45– 8:00	0345–0400
M.S.T.	3500	11:00–11:15	10:00–10:15	9:00– 9:15	8:00– 8:15	0400–0415
	3500	11:15–11:30	10:15–10:30	9:15– 9:30	8:15– 8:30	0415–0430
	7000	11:30–11:45	10:30–10:45	9:30– 9:45	8:30– 8:45	0430–0445
	7000	11:45–12:00 (mid)	10:45–11:00	9:45–10:00	8:45– 9:00	0445–0500
P.S.T.	3500	12:00–12:15 (am)	11:00–11:15	10:00–10:15	9:00– 9:15	0500–0515
	3500	12:15–12:30 (am)	11:15–11:30	10:15–10:30	9:15– 9:30	0515–0530
	7000	12:30–12:45 (am)	11:30–11:45	10:30–10:45	9:30– 9:45	0530–0545
	7000	12:45– 1:00 (am)	11:45–12:00 (mid)	10:45–11:00	9:45–10:00	0545–0600

tors taking part should check their clocks, preferably by radio time signals, just in advance of the dates of the test. Also, these dates have both been made Saturday so that everyone may have opportunity for a final check on the frequency meter on Friday night. Don't forget to mark the calendar and be on hand October 24th and 31st, and pick up all the stations that you can locate sending this special test.

Look for final details in October *QST*.

STANDARD FREQUENCY TRANSMISSIONS, SEPTEMBER AND OCTOBER

Dates of Transmission

Sept. 4, Friday	BB	W1XP
	B	W9XAN
	A	W6XK
Sept. 5, Saturday	BX	W6XK
Sept. 6, Sunday	C	W9XAN
Sept. 11, Friday	BB	W6XK
	B	W1XP
	A	W9XAN
Sept. 13, Sunday	BB	W9XAN
	C	W6XK
Sept. 18, Friday	C	W6XK
Sept. 20, Sunday	C	W1XP
Sept. 25, Friday	A	W1XP
	B	W9XAN
	B	W6XK
Oct. 2, Friday	BB	W1XP
	B	W9XAN
	A	W6XK
Oct. 3, Saturday	BX	W6XK
Oct. 4, Sunday	C	W9XAN
Oct. 9, Friday	BB	W6XK
	B	W1XP
	A	W9XAN
Oct. 11, Sunday	BB	W9XAN
	C	W6XK
Oct. 16, Friday	C	W6XK
Oct. 18, Sunday	C	W1XP
Oct. 23, Friday	A	W1XP
	B	W9XAN
	B	W6XK
Oct. 30, Friday	BB	W1XP
	B	W9XAN
	A	W6XK
Oct. 31, Saturday	BX	W6XK

STANDARD FREQUENCY SCHEDULES

Friday Evenings Schedule and Frequency			*Friday and Sunday Afternoons Schedule and Frequency*		
Time (p.m.)	*A*	*B*	*Time (p.m.)*	*BB*	*C*
	kc.	*kc.*		*kc.*	*kc.*
8:00	3500	7000	4:00	7000	14,000
8:08	3550	7100	4:08	7100	14,100
8:16	3600	7200	4:16	7200	14,200
8:24	3700	7300	4:24	7300	14,300
8:32	3800		4:32		14,400
8:40	3900				
8:48	4000				

Saturday Morning Schedule and Frequency	
Time (a.m.)	*BX*
	kc.
4:00	7000
4:08	7100
4:16	7200
4:24	7300

The time specified in the schedules is *local standard time at the transmitting station.* W1XP uses Eastern Standard Time, W9XAN, Central Standard Time, and W6XK, Pacific Standard Time. Schedule BB transmitted by W1XP is intended particularly for European amateurs and starts at 2100 G.C.T. Schedule BX is transmitted especially for amateurs in Oceania and the Far East. It is transmitted starting at 1200 G.C.T. by W6XK. Reports on these special schedules are particularly desired, not only from overseas hams but from those in the Americas.

Although the frequencies of the transmitting stations are not guaranteed as to accuracy, every effort is made to keep to within 0.01% of the announced frequencies. The frequency standards are calibrated against the National Frequency Standard. Frequent checks on the transmissions are made by laboratories equipped with accurate frequency standards and the transmissions are also checked by the U. S. Department of Commerce monitoring stations.

TRANSMITTING PROCEDURE — NEW CHARACTERISTIC LETTERS

The time allotted to each transmission is 8 minutes, divided as follows:

2 minutes — QST QST QST de (station call letters).

3 minutes — Characteristic letter of station followed by call letters and statement of frequency. For the month of September, the characteristic letter of W1XP will be "G"; that of W9XAN will be "D"; and that of W6XK will be "F." *Effective October 2nd, however, the characteristic letter used by W9XAN will be changed to "O" and that used by W6XK will be changed to "Z."* W1XP will continue to use "G." The new letters will be more suitable for calibration purposes.

1 minute — Statement of frequency in kilocycles and announcement of next frequency.

2 minutes — Time allowed to change to next frequency.

THE TRANSMITTING STATIONS

W1XP: Massachusetts Institute of Technology, Round Hill Research, South Dartmouth, Mass., Howard A. Chinn in charge.

W9XAN: Elgin Observatory, Elgin National Watch Company, Elgin, Ill., Frank D. Urie in charge.

W6XK: Don Lee Broadcasting System, Los Angeles, Calif., Harold Peery in charge.

REPORT AND TEST BLANKS

Blanks for reporting on the regular S. F. transmissions will be sent postpaid upon request. Just send a card or message to the Standard Frequency System, *QST*, West Hartford, Conn., asking for S. F. blanks. Although no formal entry in the October tests is necessary, log sheets for recording the measurements and schedules of the

(*Continued on page 90*)

EXPERIMENTERS' SECTION

Push-Pull Modulation

PUSH-PULL oscillators and push-pull amplifiers are quite well known and widely used, but it seems that push-pull modulators are as scarce as the proverbial hen's teeth. Why this is so is a deep dark secret. No one seems to use it or even to think of using it. The advantages of push-pull should apply to modulators as well as to oscillators or amplifiers. Perhaps one reason why it is not more widely used is because there is very little information on the subject. Diagrams are never published, and no one has advocated the use of push-pull modulators.

Fig. 1 shows a hookup for push-pull modulators and amplifiers using the Heising system. Only the modulator and amplifier are shown, as the speech amplifier, oscillator, etc., are the same as would be used in any other transmitter. No constants

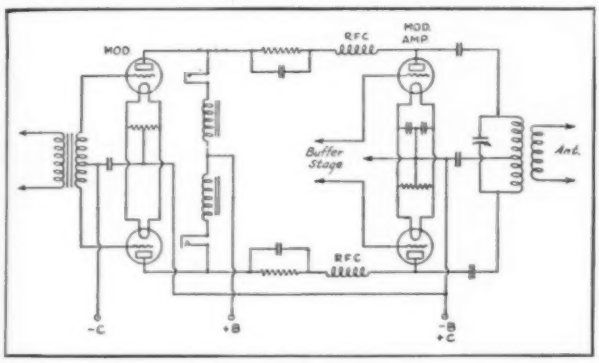


FIG. 1

are given as the parts are practically the same as those using one modulator and one amplifier tube, except it requires about two of everything. It is hoped this diagram will encourage its trial and further experimentation. The writer would be glad to hear of the results obtained with this method.

— J. M. Reed, W6EIJ

Blown-Out Filter Condensers

Several articles have appeared on these pages regarding the possible repair of blown-out filter condensers. Here's another one. Recently the writer had the age-old (but still sad) experience of blowing a filter condenser. A method of repair was at once sought, for they are not given away with a pound of butter *yet*.

The culprit was taken out of its metal case and was found to be composed of four sections. Each section was tested and, fortunately, only one proved to be shorted. This section was then removed from the tar and unwrapped, and sure enough, when about half of it was unwrapped there appeared a long string of black smudges, some of which plainly showed lots of daylight. This part, it was at once plain to see, was of no further use in the condenser. So it was promptly torn out of the long strip and the loose ends of the tinfoil were separated from the wax paper covering for about six inches. They were then spliced together, using the six inches for the splice, just laying the tinfoil to tinfoil and wax paper to wax paper. Care was exercised to maintain the proper continuity of the conductors and the splice was firmly held together until there were several layers rewrapped over it.

The experiment was then put back together and the tar remelted, and this condenser has functioned as well as ever for about a year. The above scheme might not work in all cases, but it may keep some poor ham from crying all night over a blown filter condenser when it might be similarly repaired.

— K. M. Isbell, W6BOQ

Simultaneous Listening on Receiver and Monitor

In making use of Standard Frequency Transmissions with a frequency meter which also has to serve as a monitor at times, I came across the idea of using the phones for both receiver and monitor. This was possible because of the d.c. isolation of the phones in the receiver. The connections of the last audio amplifier are indicated in Fig. 2.

I would like to point out that the signals will be attenuated somewhat if the impedance of condenser *C* is low at audio frequencies. The tube impedance is considerable as compared to the phones, if a Type '99 is used, and should not reduce the signal strength as much as condenser *C*, which should not be greater than .001 μfd.

In operation the receiver is tuned to the incoming standard frequency signal and then the frequency meter heterodyned to zero beat with the receiver out of oscillation. When coupling is close the setting of the frequency meter may be brought to the edge of zero beat from both sides

and the mean reading or true zero beat point interpolated.

This scheme may be further used to monitor

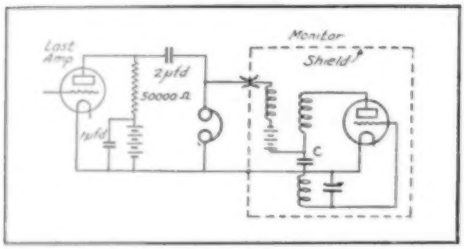


FIG. 2

the transmitter continuously with or without turning the receiver off.

— Lowell Leist,
1124 12th St., N. W., Canton, Ohio

This arrangement provides a solution to the problem of working break-in and simultaneously listening to one's own signals. Several similar schemes, such as using output transformers with the primaries connected in the receiver and monitor respectively and the secondaries connected in series with the phones, choke and condenser combinations, etc., have been suggested and will work equally well. The chief point is that the phones must be isolated from the plate battery in either the receiver or monitor plate circuit unless the same plate battery is normally used for both.

R. F. Pickup

One of the nicest pickup gadgets for neutralizing amplifiers is a loop of wire and a thermo-galvanometer. However, not many fellows have thermo-galvanometers, but quite a few do have

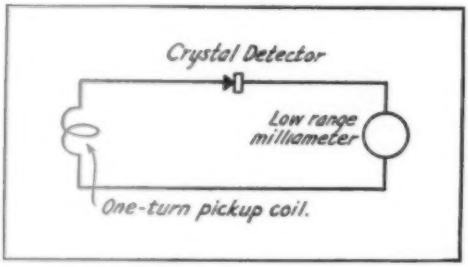


FIG. 3

low-range d.c. milliammeters, and a sensitive pick-up device can be manufactured in a few moments' time with such a meter and a crystal detector. Fig. 3 shows how to hook it up. This stunt used to be quite popular some years ago, when a good many of them were used as resonance indicators on wavemeters. A milliammeter with any scale up to 10 milliamperes will work O.K., although the lower the range the more sensitive the device will be. A 1-mil scale is excellent.

— C. H. Jenkins, Jr., W3VX

Grid Keying

Dr. E. C. Woodruff, W8CMP, Atlantic Division Director, uses the system shown in Fig. 4 for obtaining bias for a multi-stage transmitter and also for blocked-grid keying. A "B" substitute furnishes the "C" voltages required, and the individual bias on each stage is regulated by means of the series of resistors shown in the diagram. Each of the resistors should have a fairly high range — 25,000 ohms or so will be about right. In Fig. 4 bias is available for three stages, but more resistors could be added for a greater number of stages.

The extra bias battery shown in Fig. 41 is used at W8CMP because the eliminator did not furnish quite enough bias for the keyed stage. This battery might not be necessary in other installations. The operation of the keying system is quite simple; R_1 is adjusted with the key

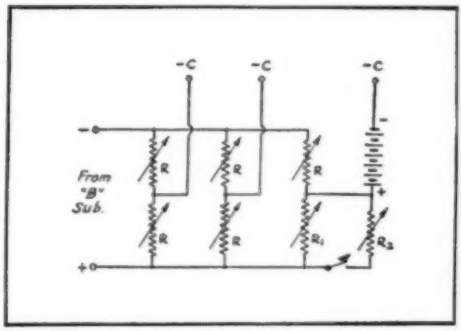


FIG. 4

open until the plate current of the keyed tube is completely cut off when excitation is applied. With the key closed R_2 is adjusted to give normal output. A broadcast receiver is used for monitoring, and although no keying filter is used no clicks or thumps are audible.

One point to be watched in using a bias system of this sort is that the bias on any tube will depend to some extent upon the amount of excitation the tube is receiving. In other words, the voltage across the divider resistors will be the sum of two currents; that from the "B" eliminator and the grid current for the stage in question. The bias for each individual stage should therefore be adjusted under operating conditions; that is, with each tube receiving excitation.

Suppressing Light-Plant Interference

By Jay Hare, W9DQW

Being located in the country where my only source of electrical power is the farm-lighting plant, and knowing that many other hams are similarly situated, I believe the following may be of use to some of them.

Owing to the "static" put out by the average light plant it is almost impossible to receive another amateur station with the plant running, and yet it is both inconvenient and expensive to

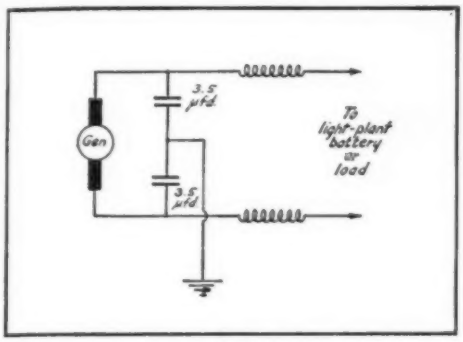


FIG. 5

stop and start the plant as the transmitter is operated. And with a battery plant it is more economical to have the plant running while the station is being operated.

After considerable experimenting a method for suppressing the interference has been worked out and is 100% successful at this station. Consequently the light plant is nearly always running while the set is in operation and during that time stores sufficient energy in the 32-volt battery to supply all of our other needs for power.

The scheme used here is the simple one of placing a radio-frequency choke in each lead coming from the generator and using two by-pass condensers in series across the line with the middle connection grounded to an individual ground rod as in Fig. 5. The chokes are made by winding 250 turns of bare No. 6 copper wire around a piece of ¾" (1⅛" outside) gas pipe by turning the pipe and keeping a strong tension on the wire, then allowing the wire to unwind leaving about 235 turns. The coil is then slipped from the pipe and put on a wooden stick on which it can be supported and stretched just enough so the turns will not touch each other. The coil as it comes off the pipe has the appearance of a large coil spring. Somewhat smaller wire will do but will add resistance in the light-plant circuit.

Lowering the Cost of Plate Power

Many amateurs are undoubtedly limited to low power owing to the high cost of Type '81 tubes. However, there is another way in which one or two Type '10 tubes can be supplied with plate voltage — and at a low price. This consists of four Type '80 tubes connected in a bridge rectifier circuit. The two plates of each tube are connected in parallel. Of course, three filament windings are required, but on the other hand a center-tapped plate transformer is not necessary. This means that a transformer designed for use with Type '45 tubes can be used by connecting to the two outside ends of the winding (disregarding the center tap). Such a transformer usually gives from 300 to 400 volts each side, and when used in this way usually will deliver about 65 mils without overheating.

This system has been used to supply plate voltage for an m.o.p.a. with a 211-D amplifier and has given excellent results. The measured plate voltage was about 825 at 125 mils. The transformer used gave 750 volts r.m.s.

No signs of ionization or overheating are apparent in the tubes, and they seem to be operating quite normally in every way.

— Roy Usher, VE4EA

500-Cycle Supply for Filters

By Edwin L. Murrill, W8OK–WLH1

It seems that only disparaging remarks are made about the use of 500-cycle plate supply.

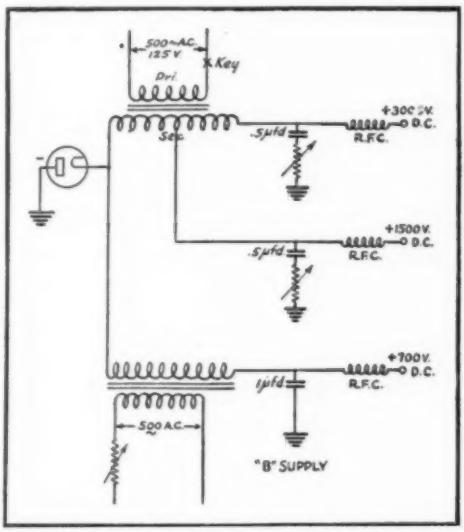


FIG. 6—500-CYCLE PLATE SUPPLY WITH RECTIFIER AND FILTER

Yet this source of a.c. when rectified makes a beautifully smooth supply for the transmitter. A 500-cycle supply is almost nine times easier to filter than 60 cycles. At half-wave it is more than four times easier to filter than full-wave 60-cycle supply. In other words, half-wave recti-

fication used with a 500-cycle alternator will be much easier to handle than a 60-cycle full-wave filter.

Any 60-cycle transformer will work satisfactorily on 500 cycles. If you desire to wind your own transformer it will not be necessary to center-tap the secondary. Another device which may be used to help obtain a pure d.c. note is to place a resistance in series with the filter condensers. A

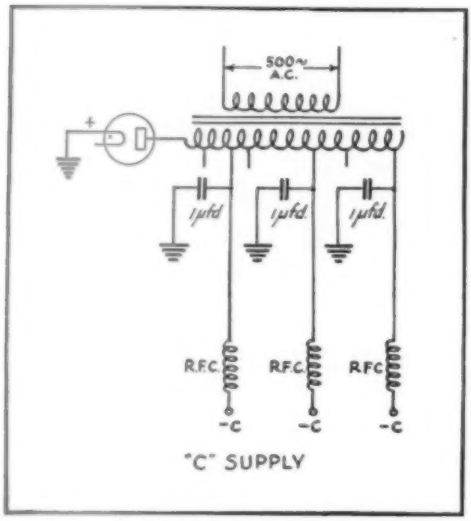


FIG. 7—GRID BIAS RECTIFIER FOR 500 CYCLES

resistance in series with a capacity does not lower the total capacitance, but reduces the charging rate. The charging rate of the condensers may be regulated, thereby smoothing up the note considerably and eliminating chirpy signals.

The diagrams as used at W8OK, Figs. 6 and 7, are self-explanatory. A separate transformer can be used for each voltage if desired. The "B" voltage rectifier tube is a large size Rectobulb, and the "C" supply rectifier may be any type that will handle the voltage required. The transformers giving "C" voltage and "B" supply to the crystal oscillator may be homemade jobs with their secondaries scramble wound. A primary rheostat may also be used in this circuit.

The writer does not believe — when installation costs and upkeep are considered — that this idea of half-wave rectification using 500 cycles can be equaled for flexibility, simplicity and quality of d.c. output by any 60-cycle filter outfit. This is especially true because a great many stations have an alternator on hand or can obtain one cheaply.

Cutting Sheet Aluminum

Most amateurs at some time or other wish to make an aluminum cabinet and a receiver with plenty of inside shielding. The first question that comes up is that of cutting sheets to the correct sizes without going to the expense of having it done.

The answer is simple — break the aluminum. All the tools that are necessary are cheap and will be found around any amateur shack. Some kind of a sharp tool with which to mark the aluminum and two pieces of angle iron are all that are necessary.

Lay out the aluminum accurately. Then place the piece to be cut between the two pieces of angle iron with the line marked just showing above the angle iron. Clamp this firmly in a vise. Then take a sharp tool — a wood chisel will do the trick nicely — and with a firm pressure run along the line, making a deep cut in the aluminum. Repeat this three or four times. Then, leaving the aluminum in the same position, do the same thing to the other side. This will cut the surface of the metal and allow a clean break to result.

After making several of these deep cuts on each side, grasp the top of the sheet in both hands and work it slowly back and forth, being careful not to bend it too far in either direction. If you do this the aluminum will bend and will not be flat. After bending it back and forth until it breaks take a file and touch up the edges. If care is used in marking off the sheet, it will be the exact size because the aluminum cannot break in any other place except where it is marked.

If several small pieces of aluminum are wanted for brackets the idea is very well adapted for this kind of work. One long piece is first broken and then the small pieces can be broken one after another until the required number is secured. These only need touching up on the edges.

If a very long piece of aluminum is to be broken it will be necessary to place a "C" clamp on the end of the angle iron farthest from the vise. If this is not done the angle iron will tend to spring apart, allowing the aluminum to bend at that end instead of breaking.

Aluminum up to 1/8 inch has been cut by the writer in this style with entirely satisfactory results. Of course the thicker the aluminum the deeper will have to be the marking. It is surprising, though, how small a mark will permit the aluminum to break.

— *P. D. Zurian, W9BMY*

Strays

Amateurs residing in the U. S. A., Canada or other countries may obtain free QSL cards by writing the Secretary of the World's Grain Association, Regina, Sask., or to Mr. A. Driver, 1900 Robinson Street, Regina. Upon receipt of application the writer will receive 100 QSL cards advertising the World's Grain Exhibition for 1932. This feature has been made possible through the efforts of the Regina District Radio Association.

AMATEUR RADIO STATIONS

VE2AP, Westmount, P. Q.

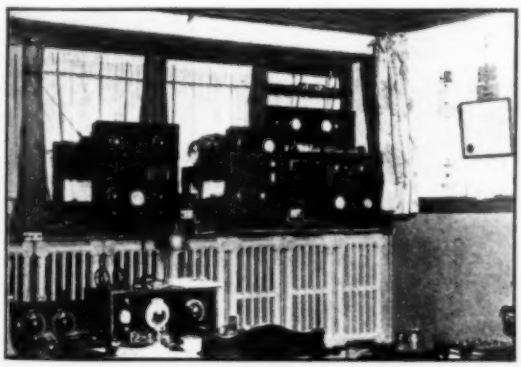
IN April, 1928, the owner of what is now VE2AP lost his way in the many corridors and labs of the Macdonald Engineering Building of McGill University and bumped into a door labelled "Radio Station NC-2BJ." Curiosity kills the cat, so they say, and this is how VE2AP started.

At present three transmitters are in operation. Memories of the first Type '10 in the t.p.t.g. still exist, but that is all. The 14-mc. transmitter is crystal-controlled, starting with a 7-mc. crystal and a Type '10 oscillator followed by a '10 doubler, '10 amplifier and the final '52 feeding the antenna.

The 7-mc. transmitter is a t.p.t.g. affair with a '52 and works very satisfactorily with 150 watts input.

The 3.5-mc. transmitter is crystal-controlled and has a 211-E feeding the antenna. The oscillator and buffer stages are '45 tubes. The input to the last stage is 70 watts.

There are four power supplies. The first delivers 300 volts for the oscillator stage of the 14-mc. transmitter. The second supplies 500 volts for the doubler and first amplifier stages of the same transmitter. The third has an output of 325 volts for the oscillator and buffer stages of the 3.5-mc. transmitter. The fourth power supply, utilizing '66 tubes, supplies any voltage by means of taps on the secondary and a resistor in the primary of the high tension transformer. This high tension can be switched over to the final stage of either crystal-controlled transmitter or to the self-controlled outfit on 7 mc.



NICE-LOOKING EQUIPMENT IS A FEATURE OF VE2AP
The station is owned by John C. Stadler, 4334 Westmount Avenue, Westmount, P. Q.

The filter equipment in all low-tension power supplies consists of 4-μfd. condensers placed on each side of a 30-henry choke. In the larger power supply provisions are made to accommodate the filtering equipment to the output voltage and current conditions. Usually, three 4-μfd. condensers are placed each side of a 15-henry choke.

The receiver is a home-made 3-tube a.c. affair with a stage of untuned r.f. using a '24, a '24 detector, and a '27 amplifier.

A dynatron frequency meter with a '22 has been in use for over six months and is giving great satisfaction so far as good measurement is concerned. In the same cabinet a monitor is built in a Hammarlund shield.

Since December, 1930, VE2AP has become an ORS and gives a hand to the S.C.M. to keep in touch with the Montreal gang. It is expected that 'phone work on 14 mc. will be resumed soon, as the previous low-power outfit performed splendidly.

W3ZX, Collingswood, N. J.

W3ZX is owned and operated by Carroll D. Kentner at 389 Park Avenue, Collingswood, N. J. The transmitter is a crystal-controlled affair, working on either 7 or 14 mc. 'Phone can be used on the latter band.

Most of the equipment at the station is visible in the photograph. The transmitter proper is on top of the cabinet at the left, which contains the power supplies. On the table to the right of the cabinet are the monitor, receiver, frequency meter, key, 'phones, microphone and the other accessories usually found on an operating table. The shelf underneath this table holds the modulating equipment.

The transmitter has four stages, the first of which is a 210 crystal oscillator on 3575 kc., running with 300 volts on its plate. This is followed by an 865 stage which can be tuned to either 3.5 or 7 mc. It is used as a 3.5-mc. buffer when the last amplifier is working on 7 mc., and as a doubler to 7 mc. when the output is on 14 mc. The third tube in the outfit is an 841, operating as a doubler on either 7 or 14 mc. This tube also has 550 volts on its plate, with a negative bias of 270 volts. Its output serves to excite the final amplifier, a neutralized 852. The input to the '52 is usually around 160 watts at 1500 volts.

The bias on the tube is 120 volts for c.w. operation.

For 14-mc. 'phone the bias on the '52 is increased to 150 volts and the plate voltage is dropped to 1100. The modulator tube is an 845 with 1350 volts on its plate. There are two stages of speech amplification, the first using a '27 tube

W3ZX

A crystal-controlled outfit working on 7 and 14 mc.

and the second a pair of '45's in push-pull. A Western Electric single-button microphone is used.

The low-voltage power supply furnishes 550 volts where needed, and consists of the conventional pair of '81 rectifiers, a brute-force filter with two 30-henry chokes and a total of 12 μfd. of condenser capacity, and a voltage divider for tapping off voltages for the various stages. The high-voltage is obtained from a Thordarson 750-watt transformer (only the 1500-volt tap is used), a pair of '66 rectifiers, and a 1-μfd. condenser. The power supplies are controlled by relays arranged to allow operation of the station with a minimum of effort.

The receiver is a d.c. outfit with a stage of tuned r.f., screen-grid detector and one audio. The tuning controls for the r.f. and detector are ganged, making single dial control possible. Auxiliary apparatus includes a frequency meter, monitor and modulometer. The antenna is a 3.5-mc. Zepp with 20-foot feeders. A separate short wire is used for receiving.

A complete log of stations worked is kept, and a writing desk full of QSL cards gives practical testimony of the station's activities. More than twenty countries have been worked, including several South and Central American stations on 14-mc. 'phone.

W4WZ, Lawrenceburg, Tenn.

THIS station is owned by James R. Donovan, Lawrenceburg, Tenn. His call-book address shows that he works at a broadcasting station, and perhaps that is the reason for the exceptionally neat appearance of the outfit.

The transmitter is a three-stage crystal affair, with a Type '10 oscillator operating on 3605 kc., a Type '50 doubler (a '10 gives the same output here, but the '50 is used because it happened to be available), and a pair of '10's in parallel which can be worked on either 7000 or 14,000 kc. The last pair of tubes is neutralized when working on the same frequency as the doubler, but the neutralizing condenser is cut out of the circuit when the last stage is used as a 14,000-kc. doubler. Although some efficiency is sacrificed by operating the output stage as a doubler on 14 mc., the power output is sufficient for satisfactory operation in this band. On 7000 kc. the output is all that could be desired considering the size of the tubes used.

Two power supplies are used, one handling the output stage and the other the oscillator and doubler. The main power supply consists of a 750-volt transformer, a pair of Type '81 rectifiers, and a filter with a total of 6 μfd. and a home-made 30-henry choke. In normal operation the plate voltage is 650 and the plate current 125 milliamperes. A 450-volt transformer is used in the power supply for the first two tubes, and its output is rectified by two Type '80 tubes, each used as a half-wave rectifier with the plates in the individual tubes connected in parallel. The filter is the same type as the main plate supply.

W4WZ LOOKS AS THOUGH IT WAS MEANT FOR BUSINESS

The transmitter is mounted on top of the cabinet which holds the power supply equipment. Nothing haywire about this outfit.

When the transmitter is in operation the first two tubes run continuously, and the keying is done in the positive high-voltage lead to the last amplifier. A conventional thump filter completely eliminates clicks in a broadcast receiver in the same house. A home-made keying relay is used to break the high-voltage line.

The receiver is a four-tube set similar to the one described in November, 1928, *QST*, and in the *Handbook*. The secondary of a dollar audio transformer with the core removed is used in the peaked amplifier, and has been found to give a somewhat sharper peak than the ordinary Ford coil secondary, besides being easier to handle. For local work a 25-foot receiving antenna is used, but for DX hunting there is a 350-foot wire. This antenna is 120 feet high for most of its length and gives excellent signal pickup, as might be expected. A cracker-box monitor is used for checking the transmitter.

The transmitting antenna is a single-wire fed Hertz, cut for operation in the 7000-kc. band. The feeder is about 50 feet long. This antenna has given the best results of several types tried, and works well on 14 and 28 mc. A split Hartley oscillator with series feed is used with a Type '10 tube for occasional work on the latter band.

W4WZ operates chiefly for the pleasure derived from DX, rag chewing and experimenting, but traffic is always handled when requested. All continents except Asia have been worked many times.

Strays

GENERAL GIBBS RETIRES

Major General George S. Gibbs, for the past three and a half years Chief Signal Officer of the Army, retired from active service at his own request, on June 30th, to become a Vice-President of the International Telephone & Telegraph Corporation at New York.

General Gibbs served more than thirty-three years in the Army, practically all of it in the Signal Corps, occupying every grade from private to Major General, retiring in that most enviable of positions, chief of his branch. No more splendid friend of American amateur radio ever held high rank in Washington. Under his administration the relations between the Signal Corps and the A.R.R.L., represented in the Army-Amateur Radio System, were strengthened and brought to a high level of efficiency and usefulness. As a delegate of the United States to the first meeting of the C.C.I.R. at The Hague in 1929, he was the very effective American spokesman when amateur questions arose, as reported in *QST* of that period. American amateur radio will be as one man in regretting his retirement from office, and in extending him best wishes in his new work.

The new Chief Signal Officer is Major General Irving J. Carr, who has had a similarly long and varied Army career. During the war he served in France as the Chief Signal Officer, 3d Army, A. E. F. Lately he has been Assistant Director of the Army Industrial College at Washington.

When W8DZF's electric soldering iron went west recently, something had to be done. The heating element was removed from an electric heater and the resistance wire rewound on a hollow porcelain tube about 1½ inches in diameter. An ordinary soldering iron was found and placed inside the tube, and work proceeded as usual.

Financial Statement

BY order of the Board of Directors the following statement of the income and expenses of the American Radio Relay League, Inc., for the second quarter of 1931 is published for the information of the membership.

K. B. WARNER, *Secretary.*

STATEMENT OF REVENUE AND EXPENSES FOR THE THREE MONTHS ENDED JUNE 30, 1931

REVENUE		
Advertising sales, *QST*	$13,758.92	
Newsdealer sales, *QST*	10,861.74	
Handbook sales	6,230.81	
Advertising sales, Handbook	1,790.00	
Beginners' Booklet sales	294.94	
Membership dues	8,255.27	
Emblems, net	97.45	
Miscellaneous sales, net	944.49	
Interest earned	422.92	
Cash discounts earned	343.74	
		$43,000.28
Deduct:		
Returns and allowances	$4,093.85	
Cash discounts on sales	265.14	
Exchange and collection charges	3.06	
Provision for Booklet returns	0.54	
	$4,362.59	
Less reduction of provision for newsstand returns	663.73	
		3,698.86
Net revenue		$39,301.42
EXPENSES		
Publication expenses, *QST*	$12,006.45	
Publication expenses, Handbook	3,095.49	
Publication expenses, Booklet	240.63	
Salaries	19,623.71	
Forwarding expenses	562.90	
Telephone, telegraph and postage	1,255.71	
Rent, light and heat	1,187.55	
Traveling expenses	1,575.58	
Office supplies and general expenses	2,016.63	
Depreciation on furniture and equipment	349.65	
Bad debts charged off	204.80	
Loss, sale of equipment	22.50	
Communications Department field expenses	46.28	
Headquarters Station expenses	123.26	
Total expenses		42,311.14
Net loss from operations		$3,009.72

THE COMMUNICATIONS • DEPARTMENT •

F. E. Handy, Communications Manager — E. L. Battey, Asst. Coms. Manager

Operator's License Suspended

WASHINGTON, July 9, 1931. — The operator's license of Mr. Raymond Lewis Donaldson, 107 Henriette Blvd., Amsterdam, New York, has been suspended for a period of six months in view of his violations of the Radio Act of 1927 in that (1) he failed to operate his transmitter (W8HF) on a frequency assigned to amateurs, and (2) he failed to have posted his operator and station licenses. The operator in question ignored the matter of off-frequency operation when this was called to his attention by the A.R.R.L. and the Navy Department on occasions when radiations from W8HF were present on 4015 kc. as well as at a point within the band.

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ADVICE FROM W9ALO

Mr. R. E. Valgren (W9ALO), of Valley Springs, South Dakota recently had the misfortune to have his licenses suspended indefinitely for operating a 'phone in the part of the 3500–4000-kc. amateur band where only c.w. telegraph operation is permitted by the regulations. Mr. Valgren's difficulty is said to have been due to carelessness in adjustment and inability to get an accurate calibration on the 3550-kc. edge of the 'phone band. Mr. Valgren wishes to pass the word along to all other 'phone men, warning them to "take care" and *observe the assigned frequency bands* and *make use of the standard frequency transmissions.** He is building a dynatron frequency meter and as soon as he can go on the air again he will ask the S.C.M. for appointment as A.R.R.L. Official Observer to help other hams keep "on frequency." W9ALO's case shows what might happen to any of us who neglect precautions in these matters. We are receiving increasing evidences every month that the Radio Division is right on the job seeing that all government regulations are observed closely by amateurs.

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WATCH FREQUENCY!!
KEEP YOUR LOG CAREFULLY AND FULLY.
KEEP THE STATION LICENSE POSTED NEAR THE TRANSMITTER.
POST THE OPERATOR'S LICENSE IN THE OPERATING POSITION.
CHECK YOUR DYNATRON REGULARLY FRIDAYS FROM W1XP, W9XAN OR W6XK.
USE *ONLY* THE AUTHORIZED CALL SIGNAL FROM *ONLY* THE LOCATION INDICATED ON THE STATION LICENSE.
APPLY FOR OPERATOR'S AND STATION LICENSE RENEWALS WELL IN ADVANCE OF EXPIRATION.
AVOID TROUBLE, CHECK FREQUENCY *REGULARLY* BEFORE GOING ON THE AIR EACH DAY.

*Some 'phone men have complained that they find difficulty in making use of the Standard Frequency Transmissions due to heavy QRM from 'phones working on the 3500- and 3550-kc. points. There are two remedies for this. A more general appreciation of the value of these transmissions should lead to increasing *regular* use, and less QRM — or at least to general coöperation in sending QST's and adoption of a QRX-period during the short interval necessary to secure a calibration on these points. Also the s.f. transmission of points at 7000 and 7100 kc. is exactly as useful and effective in calibrating, using a higher harmonic of the output of the "dynatron."

Those Q-Signals

By R. D. Magill*

In January *QST* (page IV) we invited contributions on every phase of amateur *communication* activity. New ideas and viewpoints, criticisms of and remedies for conditions, hints on DX, suggestions concerning radio club organization, information on interference elimination, exceptional two-way communication work covering emergencies, athletic games and trips, timely attention to operating practise, commentary on the place of radiotelephony, experimenting or development work in present-day amateur radio, data on low-power possibilities, 1750-kc. operation, etc., *all* are needed. There is plenty of romance and real accomplishment in amateur work. Read this contribution and the one presented last month. Then give us some real operating stories or the benefit of your views on different subjects.

In addition to publication of the best articles in *QST*, the author whose article appears to have greatest value of those received for consideration, has his choice of (1) a copy of *The Radio Amateur's Handbook* bound in leather cloth, (2) six pads of message blanks, or (3) six of the new type A.R.R.L. log books. Our offer is good throughout 1931. The article presented herewith is the prize-winning article for this month.

— *Communications Manager.*

WE amateurs, in common with all other radio men, have at our disposal a list of 67 "Q-signals," 25 "Aircraft Q-signals," and 54 miscellaneous abbreviations. Many of these are meant primarily for commercial work, but those that are more general are great time-savers, as most amateurs are well aware. Most of us know and use a good many of these signals, but it is the purpose of this article to point out a few which amateurs should use more than they do, and also to call attention to a few common misuses of the International abbreviations.

In the first place, there is the case of the fellow who answers our CQ, but who is so faint or so badly QRMed that we can't get his call. In such a case most of us stutter out a few question marks in place of a station call, and go right ahead — adequate procedure, perhaps, but the neat way to handle the situation is to send "QRZ?" meaning, "By whom am I being called?" Then how about the case where we think a station answered our CQ, but are not absolutely sure about it? Why not give the station a short call, send "QAV?" which means "Are you calling me?" and sign. QAV, by the way, is one of those "Aircraft" abbreviations, but there is no law against anyone using them if they find it desirable, so why not?

*W9DQD–W9DYN, 730 N. 6th St., Grand Junction, Colo.

Another Q-signal which deserves more use among hams than it gets is QTH?, meaning "What is your position in latitude and longitude (or according to any other indication)?" We frequently work a station in an unfamiliar town, and this abbreviation offers a nice way of asking the other fellow where he is. Of course the answer would not usually be given in latitude and longitude in amateur practice, but that is immaterial. DX hounds might find this one useful when working ships at sea, or in working expeditions. Another one the DX hound might occasionally find useful is QRB? (At what approximate distance are you from my station?) and still another is QRE? (What is the nationality of your station?)

Frequently we all run across the fellow who sends double without our wanting or requesting him to. If we can break him and say "QSQ" (Send each word or group once only), it will speed things up a lot. QSH, meaning "Transmit one telegram at a time, repeating it twice," is an abbreviation and a usage that traffic men should find useful.

Now for a few abuses of the Q-signals. How often do you hear a fellow saying "QTC?" when what he really wants to know is whether or not you have any traffic for him. QRU?, meaning, "Have you anything for me?" is the abbreviation to use in this case. QTC? means "How many telegrams have you to send?" and should never be used unless we know that the fellow we are working has some traffic for us, and want to find out how much. Another badly misused abbreviation is "QSP?" meaning "Will you relay to ——— free of charge?" From the meaning of this abbreviation, it is at once apparent that the only proper usage of it, for amateurs at least, is "QSP Dallas?" or wherever it is that the messages are going.

There are doubtless many other abbreviations which might be mentioned in this connection, but enough have been given to suggest some ways of improving our use of these very handy International abbreviations. The present list of abbreviations is quite complete, and many ideas can be expressed by them (especially when working a man who doesn't speak our language, hi). The main thing to keep in mind is that a little careful study, *and use*, of the International abbreviations, will prove well worth while for all of us.

C.W. Key Pounders April Contest

THE purpose of the All-April C. W. Contest was to pick the most consistent and reliable ham telegraph signals in each amateur frequency band from each Radio Inspection District in the United States and Canada. Only "high quality" signals with suitable frequency stability were eligible for consideration.

All amateurs were requested to log all high quality signals heard during the month of April and to send the list in to headquarters indicating the first and second best stations heard in each U. S. and Canadian District on each band.

The number of "first best" and "second best" votes received for the various stations was used to pick the best and second best station in each district. We are listing below the stations having the most consistent and reliable high quality signals as determined by the reports received on signals heard throughout April.

BEST IN EACH DISTRICT

	District	First Choice	Second Choice
3500:	1st	W1MK	W1ATJ
	2nd	W2SC	W2AMP
	3rd	W3CXM	W3ADM
	4th	W4LL	W4AMA
			& W4PM (tied)
	5th	W5HN	W5ACY
	6th	W9AKW	W6CZZ
	7th	W7AAT	W7ID
	8th	W8DLG	W8CEO
	9th	W9BRA	W9BNT
	2nd Can.	VE2AM	VE2AP
	3rd Can.	VE3DA	VE3DB
7000:	1st	W1MK	W1MX
	2nd	W2AFR	W2VH
	3rd	W3CXL	W3AOJ
	4th	W4FT	W4TY
	5th	W5EB	W5VQ
	6th	W6AM	W6VQ
	7th	W7AAT	W7ATW
	8th	W8BNY	W8CFT
			& W8AHN (tied)
	9th	W9ERZ	W9RP
	1st Can.	VE1BL	VE1BM
	2nd Can.	VE2CA	VE2AC
	3rd Can.	VE3BK	VE3HE
	4th Can.	VE4JR	VE4AR
	5th Can.	VE5AL	VE5EL
		& VE5DX (tied)	
14,000:	1st	W1ZZ	W1ATX
			& W1AZE (tied)
	2nd	W2JN	W2CCZ
	3rd	W3LD	W3DY
	4th	W4SR	W4VV
	5th	W5QU	W5AEA
	6th	W6DCV	W6CYR
	7th	W7ACU	W7ATA
			& W7MX (tied)
	8th	W8CPC	W8DV
	9th	W9BRX	W9GJR
	1st Can.	VE1DR	VE1DQ
	2nd Can.	VE2AD	VE2AC
	3rd Can.	VE3DR	VE3AB
	4th Can.	VE4DK	VE4BQ
	5th Can.	VE5CF	VE5BI

So few reports were received on 1750 kc. that it was impossible to select the "best signals" on that band from each district. However, the following stations received votes and may be said to have "consistent high quality signals": W2CDQ, W2CLX, W8BEV, W9AHX, W9BBS, W9DHC W9EGJ, W9EGZ, W9FAG and W9FUW.

The following lists by frequency bands contain the calls of all other stations reported as having "high quality" signals during the month of April. The asterisks indicate the number of extra times each station was reported. Those stations whose calls are italicized received one or more votes of "best" or "second best" in their respective districts.

3500 kc.

*W1AAT***, W1ADR, W1AEC, W1AFB, W1AFC, W1AFP, *W1AGN**, W1AGT, W1AHW, *W1AIF***, *W1AJD**, W1AJE, W1AKD*, W1AKR, W1AMI, W1AMK, W1ANA*, W1ANH*, W1ANC****, W1APJ**, W1APR, W1AQD, W1ARH, W1ASY*, W1ATA, W1ATK, W1ATL, W1ATO*, W1ATX*, W1AUC, *W1AVP****, W1AWY**, W1AXV, W1AYL, W1AZW, W1BAE, W1BBZ, W1BCF, W1BD, *W1BDI***, *W1BED*, W1BEG, W1BEO*, W1BEU, W1BEZ, W1BFA, W1BFH*, W1BGA*, W1BGX, W1BGY, W1BHQ, W1BHV*, W1BIE, W1BIG, W1BIL, W1BJY, W1BLI, W1BLY, W1BMX, W1BNB, W1BNL, W1BNU, W1BOR, W1BRJ, W1BSJ, W1BTM, *W1BU*, W1BVJ, W1VBP, W1BVR*, W1BVW, W1BVX, W1BWB, W1BWL, W1BZE, W1BZM, W1BZN*, W1CAW, W1CCD, W1CDC, W1CDR, W1CDX, W1CGO, *W1CGX****, W1CNE*, W1CNG, W1CT, W1CTB, W1CTC*, W1CUR, W1CY, W1CYV, W1DM, W1DR, W1ES, W1ET*, *W1FE***, W1FH**, W1FK***, W1GX, W1IP**, W1JT, W1LF, W1LK, W1LQ, W1LS, *W1MX***, W1NE, W1NS, W1OG*, W1PI, W1PK, W1PY, W1QV, W1SH, W1SL, *W1TA*, W1UE*, W1VF, W1VS, W1WV, *W1ZB*, W1ZE, W1ZY, W2AAB, W2ABW**, *W2ACD***, W2AG, *W2AGN*, W2AHF, W2AHT, W2AIQ, W2ALD*, W2AMN*, W2ANK, W2AQI, *W2AUF**, W2AWL, W2AYE, W2AZA, W2BAS, W2BCC*, W2BCH, W2BCK, W2BEC*, W2BGO, W2BIT, *W2BJT**, W2BLU, W2BNM*, *W2BRH***, W2BTK, W2BXJ*, *W2BZW****, *W2BZZ*, W2CAV, W2CAY, W2CDQ, W2CFG, W2CGO, W2CIY, W2CLA**, W2CML, W2CMP, W2CNT, W2COK, W2CRU, W2CVV, W2CWD, W2CWK*, W2CWT*, W2CYT, W2DV, W2FJ, W2GS, W2LC*, W2LV, *W2MQ**, *W2NV**, *W2OP*, *W2SJ**, W2VG, W2ZA, W3AAJ, W3AAL, *W3AAV****, *W3ADO*, W3AEW**, W3AFG*, W3AIR, W3AJS, W3AKV, W3AMH, W3APC**, W3AQN, *W3AQO****, W3ARU***, W3ASW*, W3ATR*, W3AVI*, W3BAY, *W3BBD*****, W3BBK, W3BBO, W3BBW, *W3BCC*, W3BCH, W3BD, W3BET**, W3BFK*, W3BGC, W3BGF, W3BGK, *W3BHB*, W3BHW, W3BIL, W3BJP, *W3BJX**, W3BKS**, *W3BNJ**, W3BNP, W3BQ, W3CBT, W3CIC, W3DE, *W3EV*, W3FX, W3GH, W3GS**, W3GX**, W3HH*, W3HL, W3KD, W3LC*, W3LF, *W3MC****, W3NF****, W3NK*, W3OZ*, W3PU, W3QN, *W3QV****, W3RN, W3SM, W3SN, W3UN, W3US, W3UX, W3VX*, W3WK, *W3WX*, W3ZF, W3ZN, W4AMK, *W4ABQ*, *W4AFM**, W4APX, W4CC, *W4DV*, W4DW, *W4FX*, W4GS, W4HK, W4JR, *W4JT*, W4LQ*, W4MO*, *W4OC*, *W4PBN*, W4SI, *W4SS*, W4TC, W4TR, W4UA, W4WM, *W4ZZ*, *W5AO**, W5BQE, *W5BRI*, *W5DL*, *W5ZK**, *W6AAN*, W6AHP, W6AZC, W6BBD, W6BCO, W6BJF, W6CNM, W6DPJ, *W6DQV*, W6EAQ*, W6EC, *W6EU*, *W6PQ*, W6WV, W7ASB, W7ASQ*, W7AVZ, *W7AXG*, W7BBS, *W7BCE*, *W7HX*, W7IQ, W7QC, W7UO, W8AAQ, W8ABQ, W8ACU, Q8AEB, W8AFQ, W8AGF, W8AGO*, W8AGX, W8AHY, W8AIT, W8AIW, W8AKN, *W8AKV****, W8AM**, W8AME*, W8AMW, *W8AND*****, W8AOY, W8APO, W8AQO, W8AQY*, W8ARG, W7ART, *W8ARX******, W8ATE, W8ATT, W8AVY, W8AXD, W8AXY, W8AYF*, W8AYM, W8AZO, W8AZQ*, W8BAS*, W8BAU, W8BGG, W8BHU, W8BJX, W8BKM*, W8BMX, W8BNY, W8BPE, W8BQV, W8BRJ*, W8BSE, W8BSP, W8BTY, W8BTZ, W8BWA, W8BWM, W8BWY, W8BXJ, W8BYD, W8BYI, W8BYN**, W8BZW, W8CAT, *W8CAY****, W8CBM, W8CCO, W8CEI, W8CFI, *W8CFZ*, W8CGF*, W8CGS, W8CGT*, W8CGZ, *W8CHH*, W8CJB, W8CJS, W8CJZ, W8CKI***, W8CKX**, W8CLL*, W8CMO, W8CMP, W8CNG, W8CMW, W8CNM*, W8CNO, W8COG, W8CPO*, W8CQ, W8CR**, W8CRF, W8CUG*****, W8CVQ*, W8CWK, W8CXP, W8CXX, W8CYT, W8CYX, W8CZF, W8CZP***, W8DA*, W8DAQ***, W8DBX, W8DCF, W8DDS, W8DED**, W8DFE, *W8DFR****, W8DFS, W8DFX, W8DGD, W8DH, *W8DHT**, W8DIH, W8DII, W8DJA, W8DMR**, W8DMS, W8DOI, W8DOV*, *W8DPI**, W8DPQ, W8DPZ, W8DQL, W8DQV,

W8DSP, W8DTE*, W8DTW**, W8DU*, W8DUE, W8DUM, W8DVA, W8DVE*, W8DWM, *W8DXI*****, W8DXN, W8DXW, *W8DXY*********, W8DYH**, W8DZH, W8EB, W8EBW*, W8ECF, W8ECM, W8ECR*, W8EDA**, W8EDH, W8EEB*, W8EEG, W8EFB, W8EFH*, W8EGA*, W8EHA, W8EIS, W8ELG*, W8EQ, *W8ETR*, W8FX**, W8GA, *W8GU*, W8HL, W8HO, W8HP***, W8HT*, *W8ID*, W8JW, *W8KR*****, W8MH, W8MQ, W8MV*, W8ON**, W8OV, *W8PH*, W8PK, W8PP, W8QA, *W8QE*, W8QL, W8RD, W8RP, W8SG, W8SZ, W8TW, W8UH*, W8WG, W8WJ, W8YA**, W9ACL, W9ACR, W9ACZ, W9AEZ, W9AFN, W9AIR, *W9AKL*, W9AMJ*, W9AMO***, W9ANR*, *W9AOY*, W9APG, W9AQV, W9ATY*, W9AUF, W9AXZ**, W9AZO, *W9AZR*, W9BBI, W9BCA*, W9BED, W9BEG*, W9BEU, W9BGV, W9BHC, *W9BKJ***, W9BKT, W9BMS, W9BNC, W9BNE, W9BNL***, W9BTL, W9BTT*, W9BWJ**, W9BYM, W9CEN, *W9CEW*, W9CIC, W9CKG*, W9CKV, W9CMZ, W9CNE, W9COG, W9CPA*, W9CSP, W9CTP, W9CUC, W9CUO*, *W9CVQ****, W9CVT*, W9CWE, W9CYL, *W9CYQ*, *W9DAF*, W9DAG, W9DCS, *W9DFZ*, W9DHC, W9DLO, W9DMP, W9DMW, W9DSC, W9DSV, W9DUR, W9DWR, *W9DXP*, W9DZG, W9EAM, W9EAW, W9EDI, W9EHD, *W9EMR*, *W9ENH***, *W9EOC***, W9EOX, W9EPH, W9EPV, W9EPY, W9EQG, W9ESA, W9ESH, W9ESU**, W9EUA, W9EYH***, W9EZU**, W9FAW, *W9FFY*, W9FGA, W9FGD, W9FGG, W9FHU, *W9FJ****, W9FOF, W9FRA, W9FSC, W9FSJ, W9FST, W9FUA, W9GAI, W9GBQ, W9GES*, *W9GFL*, W9GIV, W9GJT, W9GMU, W9GNA*, W9GQU, W9GUH, W9GVR, W9GWD, Q9GWJ, W9GYX**, W9JIK, W9KP, W9LL, W9LU, W9MV, W9OR, W9OS, W9OX**, W9QT, W9TK, W9TL, W9WA, W9YB, W9YV, VE2AM, VE2BB*, VE3CD, VE3DA*, VE3DB, *VE3DC*, VE3EW, VE3GT†, VE3HD, VE3QB, *VE3ZZ*, *VE9AL***.

7000 kc.

W1AAO, W1ABL, W1ABS, *W1ABZ*, *W1AGN***, W1AGP*, *W1AGU*, W1AGV, *W1AHX*, W1AJM*, W1AKI, *W1ALG*, W1ALQ, *W1ANC***, *W1ASP*, W1AVC, W1AWM, *W1AXX**, W1AZD*, W1BBA, W1BBY, W1BCC, *W1BDF*†, *W1BIT**, W1BIX***, W1BIY, W1BKD, *W1BOF*, W1BSD*, W1BSH, *W1BTA*, W1BTT, W1BVF, *W1BVL***, W1BW, W1BWT, W1BXC***, *W1BXG*, *W1BXR*, *W1CCI*, W1CDF, *W1CEK***, W1CEL, *W1CFO*, *W1CKC*, *W1CPI*, *W1CPO*, *W1CRP*, W1DZ, W1EK, *W1JO*, *W1LQ*, *W1LZ*****, *W1MP****, *W1SZ*, W1UF, W1VK*, W1XP, W1ZB, W1ZW, W1ZY, W2ABW, *W2AD*, *W2ADQ*******, W2AEH, W2AEP, W2AFT, *W2AIF*, *W2AIS*†, W2AJD, W2ALF, *W2ALU*****, W2AMA*, W2AMV, *W2ANS****, *W2ANX**, W2AOA, W2AOY, W2APE, W2ASI, *W2ASS*, W2ATH, *W2ATK****, W2ATZ, W2AUP**, W2AVJ*, W2AVO, W2AVW, W2AWQ, W2AXS, W2AY, W2BBQ, W2BCP**, W2BCW*, *W2BDJ*, *W2BDS*, W2BGK, *W2BJF*, W2BJO, W2BJS, W2BKG*, W2BKL, *W2BO*, *W2BOJ******, W2BOZ*, *W2BQ*, W2BQG*, W2BQL, *W2BRI*, W2BRO, W2BRR, W2BRZ, W2BSK*, *W2BST*******, *W2BU****, W2BUW*, W2BWF*, *W2BZN*, W2CD, W2CEK, W2CFG, W2CGD, W2CL*, W2CMO, *W2CNK*, *W2CNP**, W2CNR, W2COE, W2COI, W2CPJ, *W2CQJ**, W2CTC*, W2CTW, *W2CZF***, *W2DB****, *W2FN****, W2GH, *W2GX*, W2HO*, W2IC, W2IM, *W2JD*, *W2KG**, W2KT, *W2LA**, W2NK, *W2OA***, W2OB, W2OT*, *W2RT*, *W2RZ*, W2WF, *W2WY**, *W2ZC*********, *W3AAO**, W3ADM***, *W3ADO****, *W3AFT***, *W3AFX*, W3AGJ, *W3AGV*, *W3AHK*, W3AHP*, W3AJA, *W3ALU*, *W3AMP*, *W3AOO**, *W3AQI**, W3ARG, *W3ARK**, *W3AUI*, W3AVJ, W3AVO, W3BAT, *W3BBB*****, *W3BCF**, W3BDT, *W3BEL*, W3BFA, *W3BFK*, *W3BHE**, *W3BIZ*, W3BJH, W3BKE*, *W3BLU**, *W3BM*, W3BMC, W3BUR, W3BWL, *W3CAR**, *W3CJN**, W3CX, W3EI, *W3HY*, *W3JQ*, *W3KE**, *W3LAR**, *W3MC*, *W3MY*, *W3NT*, W3PD, W3PT, W3PX*, W3QX, *W3RW***, W3SK*, *W3UT**, *W3VB*, W3VF, *W3WX***, *W3ZF***, *W3ZK***, W3ZZ, W4AAU*, *W4AB*, W4ABA, *W4ABC***, W4ABT***, W4ABV, W4ABY, W4ADY, W4AEL*, *W4AFK*, *W4AFS**, W4AFT, W4AG, W4AGK*, *W4AGO*, *W4AGR******, *W4AKG*******, W4AKH, W4AKU, *W4AOY**, W4APA, W4AQD, W4AU*, W4AUR, *W4BK**, *W4BS*, W4CG, W4EG, *W4EJ*****, W4FQ, *W4FR*****, *W4GQ**, *W4GT*, W4HE, *W4IF*****, *W4IM*, W4JX, *W4LD*, *W4LM***, *W4LN**, *W4MK***, *W4NN*, W4NW, *W4OC*, W4OI, W4PAI*, W4PBO, W4PL, *W4QL*, W4RX, *W4SH*, *W4TO***, W4TP, W4UC, W4VC, *W4VP*, *W4WT*, W4ZH****, W4ZY, W5AAK, *W5ABY*, W5AEM, *W5AFX***, *W5AGF**, *W5AH*, W5AIO, W5AJQ, *W5ALZ*, W5APG, *W5ARC*, *W5AS*, *W5ASF*, *W5ASQ*, *W5AUL*, *W5AVF***, W5AXU*, *W5AYL**, W5AZS, *W5BCH****, W5BDS, *W5BEA****, W5BKZ*, *W5BNO*, *W5BNZ**, *W5BQE***, *W5BSE*, W5BST, *W5CA**, *W5CB**, W5EI*, *W5FW**, *W5GA***, *W5G*, *W5HJ*, *W5HY*, W5JC, W5JI, W5JV, W5KC, W5KL, *W5LU*, W5MR, *W5OW***, *W5PO*, W5QA*, W5QU, W5RG, W5RH, W5RJ, *W5RR***, W5RW, W5UA, W5WW, W5YW, W6ABW, *W6ACV**, W6AHI, *W6AIX**, K6AJA*, W6AKC, W6ALU*, W6AMM, W6AMV, W6ANN, W6AOA, *W6AOR**, W6AUT, W6AVO, W6AX*, *W6AZP**, *W6BAI*, W6BAU, W6BBB, W6BBO, *W6BBR**, W6BCK**, W6BCO, *W6BEB*, *W6BET****, W6BFA, W6BHY, W6BIB, W6BIF, W6BIN, W6BJI, W6BMW, W6BNC**, W6BPC, W6BQP, W6BSV, W6BUO, W6BVD, W6BW, W6BYQ, W6BYY, W6CAF, W6CAR, K6CCS, W6CHE, W6CII**, *K6COG*, W6CPG, W6CPJ, W6CUT, *W6CVF****, *W6CVZ*, W5CYA, W6CZU, W6DAI, W6DAS, W6DCV*, *W6DEI******, *W6DER**, W6DPF, W6DPJ*, W6DPR, *W6DRL*, W6DRU, W6DTE*, W6DXT, W6DYN, *W6EBG**, W6EBO, W6ECC, W6EEP, W6EFH, *W6FGH***, W6EGK, W6EGM*, W6EHY, W6EIF, W6EII*, W6EKC, W6ENE, W6EOG, W6EPH, *W6EQD**, *W6ERF*, W6ERL, W6ERM, W6EWK, *W6EXQ*****, W6EZA, W6EZF, W6EZQ, W6FBK, W6FCO, *K6FCX*, *W6FT**, W6FZ, W6HE, *W6HM**, *W6HS*, W6JM, W6OJ, W6PB, W6PW*, W6SB, *W6SN*******, W6SP, W6SQ, W6SU, *W6TM***, W6VE, W6VS, W6XK, W6YI, W6ZS, W6ZV*, *W7AAX**, *W7ABX*, W7AFP, *W7AFU*, *W7AFX**, W7AIT, W7AJN, *W7AMQ*, *W7ANK*, *W7ANX*, *W7APR*, W7AQJ, K7ARS, W7ASZ, *K7ATD**, W7AYY, W7CDW, *W7DI***, *W7ED*, *W7EW*, *W7FB**, *W7FU*, *W7FV*, *W7HX*, W7IC, *W7IQ*, *W7MX*, *W7QI***, *W7TO*, W7TX, *W7VK*, W7WY, W7ZD, *W8AAV**, W8AED*, W8AEH, W8AFZ*, *W8AGD*, W8AHM, *W8AJU**, W8AKC, W8ALB, W8ANO, W8AO, W8APT, W8APW, W8ATJ, W8AUS, W8AUU**, *W8AYC*, W8AYU, W8AZU*, W8BAW*, W8BAX*, *W8BAZ*, W8BBL, W8BDL, *W8BED**, W8BFM, *W8BFO*, *W8BG*, *W8BGY***, *W8BI****, W8BIF, W8BIS, *W8BJO**, W8BJX, W8BK, *W8BKE*, W8BKX, W8BM, W8BMA, *W8BQB***, *W8BQX**, *W8BQY*, W8BRS, *W8BRY***, W8BS, W8BSM, *W8BT**, W8BZK, W8CAU, W8CBR, W8CCE, W8CDJ, W8CFB***, W8CFF, W8CHC, W8CHI, W8CIR, W8CKE, *W8CKI*, *W8CKO***, W8CL, *W8CLM*, *W8CNA*, *W8CNF*, W8CNO, *W8COD**, W8CPS, W8CTE*, W8CTG, W8CTV, *W8CUT*, W8CWO, W8CYP, W8DAL, *W8DBC*, W8DCJ, W8DCX, W8DDQ, *W8DFH*, W8DGD, W8DGR, W8DHJ, W8DHN, W8DKZ*, *W8DMD*****, W8DNY, W8DST, W8DTE, W8DU, W8DUI, *W8DUW****, W8DVI*, *W8DWU*, *W8DYK*, W8DYU, W8DZM, *W8EBV*, W8ECE*, W8EEK, W8EIB, *W8EIK**, W8EIX, W8EN, W8EOH, W8ES***, W8EVA, W8FP, W8GN, *W8GZ*****, *W8LT******, W8MV, W8NI, *W8NV*, W8OZ, *W8PL********, W8PP, W8QG, W8QY, W8RR, W8RV, *W8SG**, *W8SH*****, W8SK, W8SY, W8TI, W8TJ, W8UW, W8UX, *W8VO*, W8YA, W9AA, W9AAG, *W9ACU*****, *W9ADN**, W9AG, *W9AGK*, W9AHQ, W9AIR, W9ALR, *W9AMI**, *W9AMT*****, W9AOG, W9APM, W9AQV, W9AQZ, *W9ARA****, W9ARL, *W9ASV**, W9ATY, W9AXH, W9AYD, *W9AZY****, W9BBU, W9BDT***, W9BEQ, W9BEY, W9BFL***, W9BGL, W9BGY, W9BHH, *W9BIR**, W9BLY, W9BMK, W9BMW**, W9BOV, W9BPB, *W9BPJ*, W9BPM, W9BRC, W9BRX***, W9BRY, W9BTD, W9BZM, *W9CE*, W9CKB*, W9CFN**, W9CGA, W9CGO, W9CGT, W9CII**, *W9CIV**, W9CIY*, W9CJB, W9CJM, W9CK, W9CKY, W9CKZ*, W9CLQ, *W9CME*****, W9CNE***, W9CNG, *W9CNO********, W9CNV, W9CPI, *W9CSI**, W9CSX, W9CTT, W9CTW, W9CVP, W9CVQ**, W9CWI*****, W9CYO, W9DDY, W9DFS, W9DGI, W9DGH*, W9DIT, W9DJH, W9DKD, W9DLL, W9DMU, W9DOQ, *W9DQX**, W9DSK, W9DTH***, W9DTI, W9DTQ, W9DTX**, *W9DVK*, W9DWD, *W9DWU*, W9DYZ, *W9DZX**, *W9EC*, W9ECI, W9EFC, *W9EGD*, *W9EGE******, W9EGF, W9EHK**, W9EIP***, W9EKC, W9EKM**, W9EKY, W9ELK, W9EPI**, *W9EQC*****, W9EQG, *W9ERU****, W9ERV*, *W9ETH**, *W9ET*, *W9EUL**, *W9EVB*, W9EYF, W9EYH, W9EYL, W9FAW, W9FAY, *W9FCK*, *W9FFD******, W9FGN, *W9FHY***, W9FI, W9FIL*, *W9FIO***, W9FIX, W9FJG, W9FJR, W9FKC*, W9FNO**, W9FPI, W9FQA, W9FQH, W9FRQ*, *W9FYB*, *W9FYK****, W9FYY, W9GCH, W9GDM, W9GEI, W9GES, W9GFK, W9GFU, W9GHA, W9GJJ, W9GJQ*, W9GKT***, W9GKZ, W9GLS, W9GOP, W9GS, W9GSQ, W9IO******, *W9JL*, W9LF**, W9LH, W9LN, W9MI, W9MY, W9MZ, W9OB**, *W9QI******, W9RS, W9UL, *W9UZ******, W9VM**, W9XAN, W9YA*, *VE1AC*, *VE1BU*, VE1CO, *VE1DQ*, *VE1DR*, VE2AA, *VE2AM***, *VE2AP*, VE2BB, VE2BE, VE2CA*, *VE2CX*, *VE3AQ*, VE3BK, *VE3CD*, *VE3DA*, *VE3ER***, *VE3GB*, VE3HE*, *VE3HN*, VE3JM, *VE3RF*, VE3WK*, *VE4BB*, *VE4BI*, *VE4GP*.

14,000 kc.

W1ABF, *W1AGN*, *W1APU*, W1AXA*, *W1AZY*, *W1BSD*, W1CDT, W1COL, W1CQN, *W1FH*, W1HA, W1IP, *W1LK*, W1WV, W1ZI, *W2ADU*, *W2AFR*, W2AHZ, W2AIF, W2AIS, W2AOE, *W2AQH*, W2ARB, *W2BKG*, *W2BSF*, W2BSK, W2BUX, W2CBU, *W2CCJ***, *W2CCV**, *W2CFW**, *W2CLS*, *W2CPA***, W2CRW, *W2DB**, *W2EL*, *W2GW*, *W2HN**, *W2QV**, W2RS, W2VD**, W3AMB, *W3BQ*, *W3GZ*, *W3ZB*, *W4AEP*, *W4AG**, *W4AKH****, *W4ALG*, W4BC, *W4BPF*, *W4FT**, *W4GS*, *W4HC**, W4HJ, *W4MK***, *W4NH*, *W4OC**, W4VZ, W5AAE, W5AAV, W5AFX, *W5AHI*, W5AIT, W5AL, W5ALK, *W5AOE*, *W5AZQ****, *W5BA**, W5BDE, W5BEE, W5BKB, *W5BMI**, *W5BRE*, *W5DC*, *W5KC**, W5LA, *W5MR**, W5PU, *W6QL****, *W6QV*, *W5RW***, W5UM, W6ABB, *W6AHP**, *W6AHZ*, W6AIV, W6AJ, *W6AM**, W6AMH*, W6AQJ, W6AVE, W6BSN, W6BTK, W6BTO**, W6BUZ, W6BVX, *W6BYB*, W6CAL, *W6CBP*, W6CTP, W6CYB, *W6DBT**, W6DH, *W6DZY*, *W6ECN*, *W6EEM**, W6EFC, W6EKW, W6ELC, W6ERS, W6EUP, W6EXQ, W6FT*, W6KB, W6QW, *W6SQ*, W6UD, W6UP, *W6VQ*, *W6WB***, *W6ZQ**, W7AAV, *W7ADU*, W7AIJ, *W7AJN***, W7AUL, W7AUS, *W7AWS*, W7BAC, W7BR, W7CB, W7DF, W7DP, W7FA, W7FB, *W7FH*, W7GT, W7KA, W7VK, *W7VN**, *W7YS*, W8AFM, *W8AUW*, W8AZW, *W8CCW*, W8CRA, *W8CUT**, *W8CXR**, *W8ENY*, *W8FL*, W8GI, W8LT, *W8PE*, *W8QB*, W9ACL, *W9ADN****, W9AHQ, W9AIC, W9AOG, W9AQG, *W9ARL**, W9AYD, W9BBF, W9BEP, W9BLT, *W9BNN***, W9BPG, *W9BPY*, W9BTW, W9BVH, W9BYC*, *W9COK***, W9CVP*, *W9DDQ*, *W9DEF**, W9DFI, *W9DHO*, W9DHQ, W9DQX, W9DUN, W9DUY, W9EIL, W9ELA*, W9EQP, W9ETC, W9FEC, W9FFQ, W9FIO, W9FPY, W9FQW, W9FYY, W9GJD, *W9LF*, W9RA, W9SD, W9YA, VE1AB, *VE1AK*, VE1AM, VE1BR, VE1DA, *VE3BF*, VE3GF, *VE3HD*, *VE3HE*, *VE4AE*, VE4BA, *VE4BU*, VE4GP, *VE4GU*, *VE4GX*, *VE4RS*, *VE5AL*, *VE5BH*, *VE5BL*, *VE5CV*, *VE5GL*, VE5WA.

— E. L. B.

April 'Phone Contest

THE results of our All-April 'Phone QSO Contest show that Mr. L. K. Rush, owner and operator of W4TM, has the most outstanding 'phone station in the United States on the basis that he leads all other participants, contacting 320 stations and receiving 282 reports on reception of his signals during the month of April. W4TM contacted 55 A.R.R.L. Sections, a gr ter number than any other station. The most outstanding 'phone stations in each government inspection district are W1APK, W2TP, W3AC, W4TM, W5QL,

.6AHP, W7APD, W8RD and W9EHD. VE4AR is the most outstanding Canadian participant.

Although a comparatively moderate number of 'phones entered the contest, those that did participate found the experience well worth while and enjoyable. It gave all operators an excellent opportunity to see just what their outfits could do. The 1750-, 3500- and 14,000-kc. amateur phone bands were used. Considerable 1750-kc. activity was reported from all quarters. Those who worked on 1750 kc. found contacts on that band unusually pleasing, being for the most part devoid of QRM.

The scheme of scoring in this contest was that stations send in QSL cards confirming 100% QSOs, each card submitted to count five points. But one QSO was permitted with a single station on any one band. One point was allowed for each QSO shown in the log submitted but not confirmed by a QSL card. Cards and letters received from listeners counted two points each. The summation of all points were multiplied by the number of A.R.R.L. Sections worked and confirmed by QSL cards.

The scores made by all stations entering the contest are shown in tabular form with other pertinent data. The leading station in each Section is marked with an asterisk. W4RS, Alabama, would have placed higher in the list had he not had the misfortune to be put off the air for eight days by defective apparatus.

—*E. L. B.*

APRIL 'PHONE CONTEST SCORES

(Leading station in each Section marked with asterisk)

Station	Section	Score	QSOs confirmed (5)	QSOs unconfirmed (1)	Cards and letters (2)	Sections contacted	Frequency bands used
W4TM*	Tennessee	112,200	289	31	282	55	1.7 & 3.5 mc.
W9EHD*	Wisconsin	68,220	240	76	120	45	1.7 & 3.5 mc.
W8RD*	Michigan	42,435	188	9	43	41	1.7, 3.5 & 14 mc.
W6AHP*	Los Angeles	36,425	113	110	50	47	3.5 & 14 mc.
W8RL*	W. New York	26,846	130	130	43	31	3.5 mc.
W8ACI*	E. Penna.	26,768	114	76	155	28	3.5 mc.
W4ARS*	Alabama	25,160	111	23	51	37	3.5 mc.
W9ESL*	Kansas	20,763	115	24	85	27	1.7 & 3.5 mc.
W8AWS*	Ohio	20,056	159	33	22	23	3.5 mc.
W2TP*	No. New Jersey	18,620	109	44	38	28	3.5 mc.
W8RW	Ohio	18,549	108	27	60	27	1.7 & 3.5 mc.
VE4AR*	Manitoba	18,224	91	45	18	34	14 mc.
W7APD*	Oregon	16,983	80	9	25	37	3.5 mc.
W5QL*	Oklahoma	12,879	84	25	16	27	14 mc.
W8CUL	Ohio	12,420	83	59	33	23	3.5 mc.
W9AFH*	Missouri	9,154	73	1	16	23	3.5 mc.
W4IA	Alabama	7,327	75	10	23	17	3.5 mc.
W6CEC*	Arizona	7,308	56	56	6	21	3.5 mc.
W3AC*	So. New Jersey	7,150	57	...	20	22	1.7 mc.
W6DJZ	Los Angeles	6,412	71	19	42	14	3.5 mc.
W8BWX	Ohio	3,990	48	...	13	15	3.5 mc.
VE1DQ*	Maritime	3,660	33	...	9	20	14 mc.
W9BSP	Kansas	3,390	36	12	17	15	1.7 mc.
W9AVB*	Illinois	3,312	38	17	...	16	1.7 & 3.5 mc.
W3RP*	Md.-Del.-D. C.	3,104	30	...	22	16	1.7 mc.
W6CRF*	Nevada	2,977	43	...	7	13	3.5 mc.
VE3BT*	Ontario	2,890	31	3	6	17	14 mc.
W9CXD*	Kentucky	2,800	35	...	...	16	1.7 mc.
W1APK*	New Hamp.	2,448	36	12	6	12	3.5 mc.
W9FLT	Missouri	2,424	38	...	6	12	3.5 mc.
W6CZT	Los Angeles	925	34	13	1	5	3.5 mc.
W2AOB*	NYC-LI	355	14	1	...	5	1.7 mc.
W9DST	Wisconsin	204	6	...	2	6	3.5 mc.

New B.P.L. Requirements

EFFECTIVE with November *QST* the *Brass Pounders' League* will be made up of stations *whose message totals equal or exceed 500* OR *whose deliveries* made within 48 hours *equal or exceed 100. Either* a total of 500 or proof of 100 delivered messages is sufficient to rate the B.P.L. As in the past it is necessary to keep the message file ready for call by the SCM at any time, but it is unnecessary to send messages to him unless called for. Remember the 48-hour stipulation! Messages on your hook for more than 48 hours do not count in the total.

Because of the increasing interest in traffic handling and the many more stations on the air than in the past, it seems to be a comparatively easy matter for any active amateur to "make" the B.P.L. under the old requirements of a total of 200 or 50 deliveries. The number of B.P.L. members during the 1931 summer months has been as great if not greater than the number of amateurs making the grade in *winter* months of past years. If the B.P.L. is to continue to be something for the "traffic handler" to "shoot at," it seems only logical that the requirements should be raised. To handle *a total of 500* or *deliver 100* messages in a month is a real accomplishment deserving this very special mention for which we have a B.P.L.

Traffic Summaries

(JUNE–JULY)

Pacific led by Los Angeles (5403)	15,130
Central led by Ohio (7481)	11,196
Atlantic led by Western New York (1748)	6490
West Gulf led by Oklahoma (1063)	2907
Northwestern led by Oregon (1187)	1839
New England led by Connecticut (695)	1834
Midwest led by Missouri (790)	1657
Hudson led by Eastern New York (847)	1629
Roanoke led by Virginia (1184)	1590
Southeastern led by Georgia-South Carolina-Cuba-Isle of Pines-Porto Rico-Virgin Islands (313)	871
Dakota led by North Dakota (239)	576
Rocky Mountain led by Utah-Wyoming (296)	554
Delta led by Tennessee (132)	164
Ontario	110
Vanalta led by British Columbia (50)	50
Quebec	44
Prairie led by Manitoba (25)	25

780 stations originated 12,664; delivered 9,948; relayed 24,054; total 46,666. (78.5% del.)

OHIO retains the Banner in spite of real competition from the West Coast. Los Angeles had 5403 and East Bay 3172, but Ohio's total of 7481 gives her the honors. The above summary shows the standing of all Divisions and the leading Section in each Division for the June–July reporting month. The total for each leading Section is shown in parentheses.

Official Broadcasting Stations

(CHANGES AND ADDITIONS)

(Local Standard Time)

W2CBB	(7250 kc.) Daily except Sat. and Sun., 5:15 p.m. and 10:30 p.m.; Sat., 1:00 a.m. (or later); Sun., no definite schedule.
W3AFF	(3885 kc.) Tues., Sat., 6:00 p.m.
W3AOJ	(7010 kc.) Mon., Wed., 6:00 p.m.; Thurs., 11:00 p.m.; Sat., 1:00 p.m.; Sun., 10:00 a.m.
W3PN	(7160 kc.) Daily except Sunday 7:00 p.m. (14220 kc.) Sun., 11:00 a.m.
W4ACB	(7175 kc.) Sun., 8:30 p.m.; Tues., Thurs., 9:30 p.m.
W4FV	(7030 kc.) Tues., Thurs., Fri., 8:00 p.m. (14070 kc.) Mon., Wed., Fri., 6:00 p.m.
W4KP	(7040 kc.) Tues., Fri., 8:30 p.m.
W5AWP	(3500 kc.) ('phone or CW) Mon., Wed., Fri., 8:00 p.m.

BRASS POUNDERS' LEAGUE

Call	Orig.	Del.	Rel.	Total
W8BAH	758	464	498	1720
OM1TB	617	137	761	1515
W6ASH	47	54	1349	1450
W8CHC	342	161	820	1323
W8CGS	460	251	602	1313
W8DDS	367	243	572	1182
W6AOA	68	16	1040	1124
W5VQ	25	55	771	851
W3CXL	71	103	646	820
W6EGH	237	207	362	806
W5AUC	277	103	324	704
KA1HR	179	194	318	691
W9EDQ	142	141	326	609
W6CNG	399	161	46	606
K6FCX	286	33	282	601
K6DV	169	53	302	524
W6DMJ	137	371	10	518
W8BJD	158	78	247	483
W6BPO	95	14	358	467
W6SN	185	77	191	453
W9BGW	61	111	252	424
W6AVH	6	55	348	409
W3BWT	87	102	205	394
W3AEW	30	69	280	379
W8PP	86	27	240	353
KA1SL	107	112	131	350
W5AHI	6	55	288	349
W8DGR	22	19	292	333
W1MK	70	92	157	319
W6AOR	15	50	250	315
W8CFT	8	10	292	310
W7ALM	81	189	32	302
W8DSS	47	52	198	297
W3MG	26	45	220	291
W8MH	74	64	148	286
W6ETJ	189	47	46	282
W8EGZ	41	30	182	253
W6LUT	18	7	228	253
W6DWG	179	68	—	247
W8CNM	30	43	150	243
W6CFN	102	97	42	241
W3SM	106	42	88	236
W5AUW	10	16	208	234
W8CUL	71	56	102	229
W7BGX	221	2	—	223
W8BYD	120	42	60	222
W6FFP	27	79	114	220
W9BEX	40	42	137	219
W9BWJ	126	82	10	218
W6EKC	31	58	126	215
W6EFC	40	27	142	209
W6DER	32	108	67	207
W6YAU	65	119	22	206
W6VH	182	6	18	206
W8DU	43	74	87	204
K6COG	62	54	88	204
W5BSV	183	4	16	203
W3ARV	101	11	90	202
W9DGS	27	44	130	201
W6ARY	41	155	—	196
W8BKM	56	66	74	196
W6CIQ	39	85	43	167
W6DFR	7	50	108	165
K6BOE	35	80	50	165
W6AMM	51	105	6	162
W8MV	29	120	6	155
W8DVE	21	58	73	152
W6FCO	40	90	6	145
W7ED	32	61	42	135
W8BDG	19	52	48	119
W6ZS	57	55	4	116
W3BLU	25	56	34	115
W7QI	41	66	—	107
W6CIE	26	53	20	99
W6BHY	42	54	2	98
W6CYD	17	55	20	92
W1BGW	11	52	20	83
W8BWY	5	62	7	74
W6DTT	11	50	6	67
W9BGW (June)	31	17	186	234

Deliveries count! After August 15 a total of 500 or more bona fide messages handled and counted in accordance with A.R.R.L. practice, or just 100 or more *deliveries* will put you in line for a place in the B.P.L. Why not make more schedules with the reliable stations you hear and take steps to handle the traffic that will qualify *you* for B.P.L. membership also?

Special credit should be given to the following stations in the order listed responsible for *over one hundred deliveries* in the message month: W8BAH, W6DMJ, W8CGS, W8DDS, W6EGH, KA1HR, W7ALM, W8CHC, W6CNG, W6ARY, W9EDQ, OM1TB, W8MV, W6YAU, KA1SL, W9BGW, W6DER, W6AMM, W3CXL, W5AUC, W3BWT.

W5AZV (7000 kc.) (CW) Wed., Sun., 1:30 p.m.
W6BBJ (3540 kc.) Mon., Wed., Fri., 10:30 p.m.
W6ZX (7150 kc.) Mon., Wed., Fri., 9:30 p.m.
W7AAT (7040 kc.) (cc) Mon., Tues., 10:30 p.m.
(7066 kc.) (cc) Wed., Thurs., 10:30 p.m.
(7120 kc.) (cc) Fri., Sun., 10:30 p.m.
W9AIO Wed., Sat., Sun., 6:30 p.m.
W9FNK (7100 kc.) 1st two weeks in month 3:15 p.m.; last two weeks in month 10:45 p.m.
W9IO (14000 kc.) Sun. 1st two weeks 3:15 p.m.
(7126 kc.) (cc) Mon., Wed., Sat., 9:00 p.m.; Thurs. 5:00 p.m.
(14252 kc.) (cc) Mon., Wed., Sat., 4:30 p.m.

Traffic Briefs

On June 20th a meeting of Kentucky radio amateurs was called by I. G. Watkins, W9JL, in Dicker Hall at the University of Kentucky, for the purpose of presenting a UX-852 to the Kentuckian amateur handling the greatest number of messages for a six-months period ending June 15th. Carl L. Pflumm, W9OX, was the winner of the 852. W9BAZ, SCM, acted as toastmaster and presented the tube to W9OX. An interesting educational program was arranged by Mr. Watkins. Prof. E. A. Bureau gave a talk on rectifiers. Following this talk a question period was provided so that all present could ask questions concerning their problems. H. E. Goldstine, graduate of the College of Engineering, gave an interesting talk on the kind of antenna used in commercial high frequency work by the R.C.A. Then the subject of quartz crystal oscillators was covered thoroughly by Mr. Goldstine. G. A. Stone of the Physics Department placed on demonstration the ultra-high frequency laboratory transmitter which operates on 3.2 meters, and gave a complete explanation of the theory of this transmitter. L. R. Penn, graduate of the College of Engineering, assisted Mr. Watkins and introduced the speakers of the evening. Before the meeting the group was shown through W9JL, the University amateur station. Prof. L. E. Nollau, of the Department of Drawing and the Photographic Department, made pictures of the men assembled. The following were present at the get-together: W9FZL-W5PA, W9ARU, W9DK, W9EQO, W9HCO, W9AZY, W9BPB, W9OX, W9CIS, W9BAZ, W9EAX, W9GGB, W9ERH, W9AQV, W9GIJ, W9CDA, W9HAX, W9CRJ, W9AEN, W9DNA, W9LH, I. G. Watkins and J. E. McMakin of W9JL, W. F. Kinsler, Thomas Kendall, G. A. Stone, H. E. Goldstine, Prof. E. A. Bureau, Prof. L. E. Nollau, and Milford Noe, exW9EIP.

Los Angeles, Calif., amateurs are engaged in a program of sending invitations to La Fiesta de Los Angeles, that city's 150th birthday celebration. Messages are being transmitted to all parts of the world. An average of about 500 messages per week are being sent by stations W6ETJ, W6EGK, W6BCK, W6SN, W6HT, W6DVA, W6CUH, W6AM, W6DWT, W6BRO, and W6AYJ. W6CUH and W6AM are doing most of the DX work. W1MK handled one of the messages to Governor Cross of Connecticut, an answer to which was promptly relayed back to Los Angeles. A message to President Hoover was efficiently handled via W6SN and W3CXL. Messages to many other dignitaries are being forwarded by amateur radio, and all amateurs are requested to help whenever possible in relaying this traffic.

The Chair Warmers Club is desirous of obtaining a complete list of blind amateur radio operators and enthusiasts. Any blind amateur or amateur knowing of a blind operator is requested to write to the Secretary of the club, Mr. Walt J. Colpus, W8BRS, 23 Henderson St., Pontiac, Mich., giving him all information available.

Alphy Blais, VE2AC, announces a series of 28-mc. transmissions from his station during the month of September. His tentative schedule is September 6th, 13th, 20th, and 27th at 0100, 0200, 1300, 1330, 1400, 1430, 1500, 1630, 1700, 1930, 1000, 2030, 2100, 2200 and 2230. Also on September 7th, 14th, 21st and 28th at 0000, 0100, 0200 and 0300. In addition during September, VE2AC will transmit on such dates as Experimental Station WLY transmits below 25 mc. inclusive. The same hours of transmission as WLY will be used. A copy of the schedule used by WLY will be sent to anyone requesting same. Tests from VE2AC will consist of: ten minutes sending "TEST (3 times) 28 mc. de VE2AC (5 times)." Five minutes sending "CQ (3 times) 28 mc. de VE2AC (5 times)." Ten minutes listening in on 28 mc. for calls. To permit easier contacts and reporting VE2AC will occasionally listen on 14 mc. for stations calling him. He will mention his intention of listening on 14 mc. after any sched-

ble when it is particularly desired to listen on that band. The frequency on which these tests will be sent will be approximately 28,400 kc. Different settings will be tried, however, in the higher part of the band.

The Santa Clara Valley Section is in a position to handle any amount of trans-pacific traffic. Amateurs are invited to mail or radio messages to W6NX, SCM, from whom they will be distributed to W6DMJ, W6BET and W6AMM. They can handle upwards of 100 messages per day.

Harry Wells (W3ZD) of PMZ fame is now at Brooksfield, Texas, and would like to hear from his old ham friends. Messages may be addressed to him via W5AUC, at which station he sometimes operates.

W7QI, Seattle, is keeping schedules with NIJT, K7ANQ, K7AML and K7OX. W6ZX has a schedule with K7ATD. These should be good outlets for Alaskan traffic.

W1AFU, Springfield, Mass., was the first to communicate with the submarine *Nautilus* (WSEA), on June 25th, when she had become disabled and was helplessly rolling about in the North Atlantic. W1AFU contacted WSEA shortly after 3:00 p.m. E.S.T., after they had moved into the amateur band to establish communication. After contact had been made WSEA moved back to its 16,660-kc. frequency, but W1AFU could not locate them, due to "skip effect." It is good to note that first communication after the sub was disabled was via amateur radio! FB, W1AFU.

A word from a Radio Supervisor: "No matter how annoying delays in receiving licenses may be, they do not excuse any amateur who violates the Radio Act of 1927 by placing in operation an unlicensed transmitter. Those who do so cannot be considered a proper addition to the great Amateur Fraternity which, as a whole, plays the game and is a credit to the radio art."

On Saturday evening, June 20th, the Berkshire Brass Pounders Club of Pittsfield, Mass., held its annual Hamfest at the New American Hotel, Pittsfield. By 8:00 p.m. a good number had arrived, including W8BGM from Buffalo, N. Y., and W1DP of Fall River, Mass. After a bang-up good feed, toastmaster W1ADF introduced such interesting speakers as Ross Hull, *QST*, who gave a talk on "five meters"; C. C. Rodimon, W1SZ-FE, who spoke in behalf of the Army-Amateur activities; and "RP" of W1MK. Following the speeches W1BSJ gave a comical sketch entitled "The Crime Detector and How it Works." W1AZD and W1VC took charge of the contests, and many lucky hams won prizes. Hams could be found rag chewing at various Pittsfield shacks way into the "wee sma' hours." W1AZW, chairman of the banquet committee, wishes to thank every one who had a hand in making the affair a success.

Here's the best one we've heard for some time: A. J. Gironda, W2JE, sends us a QSL card which he recently received from a beginner. The card was addressed to "Mr. H. R. Okinbook, W2JE." We'll let you figure it out.

DIVISIONAL REPORTS

ATLANTIC DIVISION

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Harry Ginsberg, W3NY — Fellows, we want that Traffic Banner, and it's up to all of us to climb right from the word "go"! We need more live Official Relay Stations; send in your applications. Write our Chief Route Manager, W3BWT, or W3AFF, Route Manager for Western Maryland, for schedules. A new club has been started at Westminister, Md.; the Westminister Amateur Radio Club. They have five transmitters among the members, viz.: W3ALV, W3WN, W3BOR, W3BRS, W3BOA; with more coming. Maryland: W3ZK, new O.O., is building a 100-kc. crystal oscillator, with multi-vibrator. W3AFF is a new Official Broadcast Station on 3885 kc. W3AOO is getting good reports on his new crystal rig. W3AHG is rebuilding in New Hampshire. W3NY moved his traffic on 7 mc. District of Columbia: W3CXL leads with a peach of a total. W3BWT has the Section with a nice total in spite of "ye summer slump." W3BAT took important traffic from K6DV. W3PN is a new O.R.S. and O.B.S. W3CAB is handling U.S.N.R. traffic. W3CDQ's new address is 3633 Everett St., N. W. W3OZ is on vacation. W3ASO will be inactive, August and September. Delaware: W3HC is building a new frequency meter for contest. W3AJH has been on Naval Reserve training duty at Newport, R. I. W3ALQ has been too busy to operate.

Traffic: W3BWT 394, W3BAT 72, W3NY 49, W3AOO 40, W3ZK 35, W3CAB 31, W3PN 25, W3HC 20, W3AFF 14, W3ASO 9, W3AHG 5, W3AJH 4, W3BKE 2, W3CXL 820.

SOUTHERN NEW JERSEY — SCM, Robert Adams, 3rd, W3SM — W3ARV made the BPL and also his ORS appointment. W3ATA, W3BPD and W3BGF are working for ORS. W3BEI is logging off-frequency stations. W3BAQ has 50 watt crystal 'phone. W3QL was on the job last RM-Nite. W3ZI will handle traffic from the summer camp of the 112th Artillery. W3BUF will use portable W3BUZ in Ponomo Mts. W3JL is suffering with the heat. W3ARN is going strong. W3AWV reports the Delaware Valley Radio Club held its first meeting. W3BMG is rebuilding. W1AJR will be located at Princeton in September. W3AWH is on 14 mc. W3ATC is getting out on 3.5 mcs. We welcome W3BTS in Atlantic City. W3ATL is now using crystal. W3BLR is hunting DX on 14 mc. W3APV has new TNT. W3LT was QSO his first Frenchman. W3ARW is back on. W3ACX is working great DX. W3AUI is on 7 mc. W3BDO is chief op at the Atlantic Radio Club. W3KY has new fifty. W3AWJ is an MD. W3KD is pounding brass in the tropics. W3SM is working DX on 7 mc. He wants new operators for the Naval Reserve. The South Jersey Radio Club now has 66 members. W3VX has a PA system on his car. W3DY leaves the gang to work in NYC. What has happened to the Salem County gang?

Traffic: W3ATC 23, W3BUF 5, W3AWV 65, W3ARV 202, W3LT 7, W3BDO 8, W3ATA 26, W3AU 8, W3ZI 28, W3JL 80, W3AWH 3, W3BEI 25, W3UT 3, W3SM 236, W3BPD 14, W3ARN 9, W3QL 152, W3BAQ 7, W3AWJ 10, W3BGF 6.

EASTERN PENNSYLVANIA — SCM, Jack Wagenseller, W3GS — Many thanks, Gang, for election. I will do my best to continue with the good work of the previous SCM. W3MG makes the BPL. W3AQQ is very QRL. W3NA sends in a nice report. W3MC's MOPA is now FB. W3ZF will be off until fall. W3AAD is now an ORS. W3AQN is working in a cut-rate radio store. W3BBK reports again. A new ANT and MAST is being erected at W8EU. W3OP was interested in DX this month. Rag chewing is consuming most of W8AIT's time. W8CFI is building a push-pull, when not QRL with YLs. W8CWO is QRT. W8AWO is experimenting with television. W3QP has a new transmitter, and it sure sounds FB. W3NF will be on shortly with remote control. W3ADE burnt out his tubes. Don't forget, fellows, we are going to step out this fall. Plan to step with us.

Traffic: W3MG 291, W3AQQ 88, W3GS 62, W3NA 50, W3MC 42, W3AAD 33, W3AQN 33, W3BBK 10, W8EU 8, W3OP 7, W8AIT 6, W8AWO 5, W3QP 2.

WESTERN PENNSYLVANIA — SCM, Robert M. Lloyd, W8CFR — W8CHC reports a carload of traffic. W8YA is keeping schedules. W8DKL submits his first report. W3AQO is on the air in Pittsburgh with the call W8CAX. W8CMP reports from Bay View, Mich. W8CTE is back after a two-year silence. W8DLG is rebuilding. W8DUT pounds away on 7 mc. W8BUC visited W8BIB in Butler. W8AGO is experimenting with crystal on 28 mc. W8CUG is contemplating higher power. W8AJE says his transmitter is on a rampage. W8APQ is having AC installed. W8AVY reports a new ham, W8FAP, in Pittsburgh. W8BSE is vacationing. W8CEO has been ill. W8DGW is

too busy to do much radio work. W8GU promises to be on the air soon. W8DVS reports there are nine hams in Ambridge. W8BSF wants a WAC. W8DIC dropped a hammer into his rectifiers. W8EEC is building a new transmitter. W8CFR cannot find time to use his transmitter.

Traffic: W8CHC 1323, W8YA 193, W8DKL 45, W8CAX 28, W8CMP 22, W8CTE 18, W8DLG 10, W8DUT 9, W8BUC 9, W8AGO 8, W8CUG 3.

WESTERN NEW YORK — SCM, John R. Blum, W8CKC — W8TZ has a new crystal rig. W8DSA has two new supports for his sky wire. W8AFM has taken up aviation. W8BFG is off the air for the hot weather. W8AYU became a "9" for vacation. W8AIM and W8ERZ are new members in Auburn. All schedules were cancelled by W8BJO for the hot weather. W8ADG has a new Zepp. W8APK has his new crystal rig going. W8DHQ is in the traffic game. W8BHK is working at WMBO. W8BYD was in Cleveland from July 5th to July 25th and visited W8BAH and W8DDS. W8DCX reported some DX worked. W8QB finds the indoor antenna very FB. W8BLP is starting up again. W8DBX is a new ORS. W8AGS is a new operator in Amsterdam. W8DSS did some excellent work in an emergency at Oneida.

Traffic: W8TZ 8, W8AFM 4, W8AYU 1, W8DME 35, W8BJD 483, W8BLH 1, W8DMJ 46, W8DES 4, W8DHQ 109, W8AYM 57, W8BIF 8, W8BHK 53, W8CPC 24, W8DII 5, W8QL 94, W8BWY 74, W8BHU 31, W8BDX 177, W8AGS 10, W8DSS 297, W8BYD 222, W8DCX 5.

CENTRAL DIVISION

MICHIGAN — SCM, R. J. Stephenson, W8DMS — W8PP showed his right to the new ORS ticket by making the BPL with the high score for Mich. W8MV came through for the same column on deliveries. Half of W8MV was out at W8HO, Camp Wallace. W8FX shows up at every club meeting with a lot of QSL cards with no QRA except station call and city. W8EBN (ex-8BKC) is on at Benton Harbor. W8BMG, vacationing up in the Mich. 9 district, visited W9HK, W9GXE, W9CSI, W9GKR and W9DUE. W8CAT, W8JD, and W8ALN are at Mich. Nat. Guard camp, Grayling. W8BTK is installing crystal. W9HK was QSO with WDDE. W9CE is through building bird houses. W9AXE says the bunch in the copper country are all rebuilding. W8DYH hangs up a new record — see his total. Hi! W8LU is installing a three-pool mercury arc. W8BJ has his yellow opr's ticket. W8DFE is getting MOPA 50-watter going. W8EBV sends in his first report. W8DDO is QRL with music and tennis. W8ACW is rebuilding for crystal. W8EGI is working for an ORS certificate. W8AUT gets his ORS this month. W8BJQ is now a "proud papa." W9EGF reports and mentions W9GQS, a new ham. W8AUT also reports W8AFH and W8FBA, new hams at Owosso. W9GXE is playing with DX on 14 mc. W8BBX and W8BKH are consolidating to put a fifty on the air. W8DED finds time from QSL production to get on occasionally. W8BV was QSO Japan with a '10. The Det. Amateur Rdo. Assn. continues to have big attendance. W9HGC (ex-W8BPT) keeps in touch with the gang here. W9ASJ, from Indianapolis, visited several Detroit shacks. W9CYQ is reported to be sojourning over in Spring Lake.

Traffic: W8PP 353, W8HO 178, W8MV 155, W8BMG 122, W8BJ 38, W8BGY 36, W8EBN 32, W9GKR 31, W8EGI 22, W8DMS 20, W8BTK 19, W9AXE 17, W9CE 16, W9GXE 15, W8BBX 11, W8DYH 9, W8ACW 8, W9EGF 7, W8EBV 7, W9HK 6, W8DED 6, W8DFE 5, W8AUT 3, W8BV 2, W8DDO 1.

KENTUCKY — SCM, J. B. Wathen, III, W9BAZ — Just to show you what summer means to reliable schedules, look at W9EDQ's total. Getting in the BPL is a habit with W9BWJ. After tearing up a nice transmitter, W9ALR found the frequency creep was in the monitor. W9OX is recuperating after winning Watkin's Trophy. W9CNE has his new transmitter on the air. Our experimenter, W9AUH, is trying out 56 mc. W9DDQ is still snagging DX. W9QT "shore" did entertain W9BAZ over "the fourth." We welcome W9CEK from down in Evarts. W9BAN will swap fotos with all comers. This month W9FQQ blew his '81s. Although his outfit is in the basement, W9EYW complains of the heat. W9GGB expects to install a '52 during August. Word reaches us that W9CEE has a yacht. W9FZV is putting in crystal. W9CDA brought W4AIS and W4AVE up to see W9BAZ. W9ARU is waiting for a cool fall. W9BEW is now located in Lexington. Reports from any A.R.R.L. members are welcome. What's the matter with the western half of the state? W9AEN now has a 510 perking. W9BBO expects to have a '10 going soon. We are glad to get word from a new Kentuckian, W9BTM.

Traffic: W9EDQ 609, W9BWJ 218, W9ALR 38, W9OX 34, W9CNE 31, W9AUH 22, W9BAZ 20, W9DDQ 11, W9QT 6, W9CEK 5, W9BAN 4, W9FQQ 4, W9EYW 2, W9GGB 2, W9CEE 1, W9BTM 27.

INDIANA — SCM, George H. Graue, W9BKJ — W9AET again leads in the state traffic contest. The following stations are rebuilding: W9AXH, W9EFV, W9FYB, W9CLF, W9BWI, W9BKJ, W9GGJ, W9AET, W9DHJ, W9ETH, W9DWL and W9AAI. W9UM burnt out the MG set. W9DHM is working the DX schedules for W9UM. W9DDB wants to hear from the new hams going to attend Purdue Univ. this fall. W9YB promises to be very active this fall and winter. W9BXQ of Denver paid W9CHA a visit. W9DSC is trying 56-mc. transmitter. W9ABW is having line QRM. W9HBK is a new station in Bloomington. W9RS is home for the summer. W9CVQ has QSY to 7 mc. for the summer. W9CUX is operating W9DWB at Crown Point for the summer. W9EPH blew a 4-mf filter. W9GM and W9HKZ are the latest additions at Richmond. W9GJG is still keeping daily schedules. W9GJS is taking the U.S.N.R. cruise. W9GYX is a new Indianapolis ham. W9CKG has changed over to crystal. W9HIU is another new one at Kokomo. W9BQH is thinking seriously of putting in crystal control.

Traffic: W9AET 129, W9CKG 118, W9GJS 48, W9GJG 20, W9FKE 18, W9GM 16, W9EPH 10, W9DWB 10, W9CMQ 8, W9CVQ 8, W9RS 8, W9GYB 6, W9AXH 8, W9ABW 6, W9DSC 6, W9EFV 4, W9CHA 1, W9BKJ 18, W9CLF 3, W9AEA 6.

ILLINOIS — SCM, F. J. Hinds, W9APY, — RM W9ERU E. A. Hubbell — Our RM made a trip to a number of our stations in the Chicago area and then on to Milwaukee, etc. W9GJJ is pounding brass on WADX. W9KB has kept his schedules with W9BXJ for over four years. W9GAI has completed his 50-watt set. W9LF is to be found nowadays on 14 mc. W9FUR is using low power. W9EGD says there is nothing like a good TNT. W9FXZ has a '52 going in great shape. The dollar and two bit '81s at W9DZU went west. There is a new 50-watt TGTP at W9CYT. W9BSR has been working his Vermont station with the call W1AVO. W9ACE has just finished a new CC MOPA. W9GYO is planning a push-pull. W8AYU visited us for a few weeks calling on W9ENH, W9APY, W9KW, etc. W9HMB is a new station in Kankakee. W9FCW is working hard for publicity of the Army-Amateur nets in conjunction with the Kankakee Chamber of Commerce. W9BYL took his third cruise on the U.S.S. *Wilmette*. W9GDM and W9JO are going at it hard with schedules. W9AMO is our high man this month. W9ATS is rebuilding. W9EJO is home for the summer. W9GFU is moving to 4544 Douglas Road, Downers Grove. Too hot for W9FTX to operate. A new MOPA is budding at W9FGN. W9FO and W9ENH are consolidating until fall. W9CF has moved the pile to W9CSB. W9BRX has graduated from Armour Institute. W9AVB has a crystal rig under construction. W9ECR says he can't keep the cans on in hot weather. BCL QRM has cropped up at W9FXE. Heat of 102 degrees has chased W9BIR out of the shack. W9FI also has fine schedules with W9DZU, W2WD and W9BMA. W9CZL is working DX, too, and now has VK5GR's card. W9LL has blossomed out with a QSO with D4XDB. ExK4KD is now back home in Mount Pulaski, Ill., after an absence of eleven years. W9ACU works schedules with Iowa and Illinois. W9AFN also was QSO D4XDB as well as PY7AR. W9AMN was on only a little. W9CKZ attended the hamfest at E. St. Louis. W9JO has increased power to 125 watts. W9HQQ is a new ham right across the street from W9JO. W9FPN has been winding transformers. W9FGD says the school work at Dodge's is heavy. W9DKF has three transmitters working on three bands. W9CUX is operating W9DWB at Crown Point, Ind. W9DZG is doing nice traffic work. W9ALA has heavy daily

schedules with W9ATS, W9FFY and W9AMO. W9PK was heard by Dutch R-154. W9CUH has the Crystal Outfit perking fine. W9FRA says traffic on 7 mc. is fair but the QRN on 3.5 mc. bad. W9CN- is building a low-power MOPA.

Traffic: W9AMO 156, W9ALA 143, W9FRA 88, W9GYO 75, W9FCW 59, W9FI 47, W9DZG 43, W9ATS 40, W9ERU 40, W9ACE 24, W9AFN 23, W9CYT 22, W9CZL 22, W9BIR 16, W9APY 15, W9ACU 13, W9FXE 13, W9FGD 12, W9CUH 9, W9KB 9, W9JO 8, W9BSR 6, W9CKZ 6, W9GAI 5, W9AVB 4, W9DKF 4, W9DZU 3, W9ECR 3, W9GFU 3, W9LL 2, W9FPN 1, W9PK 1.

OHIO — SCM, Harry A. Tummonds, W8BAH — Right back at the top again, fellows. Fine work and thanks. Well here are the elite up in the BPL this month: W8DDS, W8BKM, W8MH, W8EGZ, W8DVE, W8BDG, W8CNM, W8BGR, W8DU, W8CGS, W8CUL and W8BAH. W8CUL works entirely on 'phone. In May, this year, Ohio was divided into nine traffic districts by your SCM with a Route Manager in charge of each district. District No. 1: W8DDS, RM, says 20 schedules. W8CCK, can't print your remarks. Hi. W8AXV, RM, 7-mc. band, is waiting for 250-watt tube. W8BAC received card from ham in Russia. Got all his on 14-mc. band, says W8BNC. W8EEW just back from Camp Perry. W8TH handled NYC messages. W8DIH says 20% traffic, but has good total. W8BFA held schedules with portable W8COX. W8RN, W8CIO, W8CIY, W8BMX, W8UC send in reports. W8EBT now on S.S. *MacNaughton*, KFCU. Look for W8RN on KKUI. Here is a new reporter from Fenn College, Y.M.C.A. school, Cleveland, W8FF. W8EGO will be a new ORS. W8EXA schedules W8DVE of Akron. District No. 2: W8BKM, RM, leads the district. W8DMK should be an ORS. W8CX is working 12 hours a day now. Good reports from W8EJ and W8BCI. District No. 3: RM, W8AND, also leads his district. W8APC is out to lead his district. Busy on Berry harvest, reports W8JR. W8BTT reports. District No. 4: RM, W8MH, sets the pace for his district. W8HT should be an ORS. W8ATV gets crystal reports. Good reports received from W8ADS, W8CUR, W8BSR and W8OQ. W8DZH reports by radio. W8EEQ has schedule with W8ENH. District No. 5: W8EGZ leads District No. 5. W8DVE is a new ORS. W8NP, RM, has good report. We are glad to see W8BZB back on the air again. Here is a new reporter from Akron, W8BDG. W8BZL had a great time at Camp Perry. District No. 6: A new reporter leads this district, W8BGR. W8CFT will be a new ORS. Another ORS at Camp Perry with Ohio National Guard, W8CNM. W8DU, RM, is doing great work in his district. Glad to see a report from W8BAX this month. Received good reports from W8BBH, W8ARW and W8EVA. District No. 7: W8VP leads the district. W8CKX, RM, is getting parts in for new transmitter. District No. 8: This district wins the state honors this month and congratulations to RM, W8CGS, who leads the district. W8CUL made the BPL both ways, all on 'phone. W8DBK says R. I. will be here. W8FA had quite a few messages south. W8ENH visited with W8EEQ in Findlay. W8DUV and W8CUK are new reporters. District No. 9: W8TK reports traffic picking up. The shack is too hot, reports W8CSS and W8HH. New ORS are wanted in this district, also a Route Manager. W8BAH grabbed off 1720 total this report. Here's good news for all OHIO reports: Everybody on the air the FIFTEENTH of every month for OHIO ORS RM SCM NITE. Starts at 6 p.m. and then long into the night. Here is your chance to get acquainted with the gang. Don't forget to report to your RM by radio every month. Can Ohio ORS hit 10,000 total?

Traffic: W8BAH 1720, W8CGS 1313, W8DDS 1182, W8BGR 333, W8CFT 310, W8MH 286, W9EGZ 253, W8CNM 243, W8CUL 229, W8DU 204, W8BKM 196, W8DVE 152, W8NP 147, W8BZB 122, W8BDG 119, W8CCK 112, W8BZL 102, W8AXV 48, W8BAC 46, W8AND 44, W8BNC 32, W8VP 30, W8TK 24, W8DMK 23, W8HT 22, W8EEW 20, W8BAX 19, W8ATV 17, W8TH 14, W8BBH 14, W8ARW 12, W8DIH 11, W8FF 9, W8EGO 9, W8FA 8, W8ADS 7, W8CX 6, W8APC 6, W8EEQ 5, W8BFA 5, W8OQ 4, W8BSR 4, W8EVA 4, W8DBK 4, W8UC 4, W8EXA 2, W8DZH 2, W8ENH 2, W8JR 1.

WISCONSIN — SCM, C. N. Crapo, W9VD — W9ZY, the Lacrosse Radio Amateurs' Club, sends in their first report. W9DKH has daily schedule with W9HOR, Boy Scout Camp at Kohler. W9BIB is active. W9EHD is building a small portable transmitter. W9HFH is camping at North Haven. W9DCT built a new TPTG oscillator. W9GYQ is on at last. W9EHD will have 1-KW output in the fall. W9CFO and W9BWV are on 3500-kc. 'phone. W9OT is putting in crystal. W9VD is on 3750 Monday and Tuesday. W9GFL has been on vacation. W9FAW will be back October 1st. W9ABM is back from camp. W9SO will start up again soon. W9EYH is on 14 mc. W9HMS reports from Shiocton.

Traffic: W9ZY 69, W9DKH 38, W9BIB 35, W9EHD 22, W9HFH 14, W9OT 2, W9VD 16.

DAKOTA DIVISION

SOUTHERN MINNESOTA — Acting SCM, Vic Schleuder, W9BKX — W9AIR, our SCM, is on the U.S.S. *Paducah* for the annual U.S.N.R. cruise. W9BNN delivered some traffic from FX in the wilds of Venezuela. W9BTW–W9ELA were QSO the Northern Light off the Fiji Islands. W9FMB enjoyed his vacation. W9HMV at Clarkfield has a '10 on 1.7 and 3.5 mc. W9BNF and W9FJI have gone into business together. W9FPY holds down two jobs so is a bit QRL. W9EYS deserted the junk for the outdoors. Ask W9AIR about a folding 800-meter 8-wire ant. Sperling of W9BKX, who is old-time W9BBF, got himself a personal call again, W9HQG. W9EEB is building a new transmitter. W9GUX is new ham at Minneapolis. W9CKU has left on a trip east. W9HMV is building AC screen-grid receiver. W9HNO is new ham at Clarkfield. W9FFY is moving to Minneapolis August 15th. W9AKN got card confirming QSO China. W9EJP, ex-Menasha, Wis., is now a So. Minn. ham at Winona. The Le Sueur Gang have been hamfesting. W9DHP and W9DGE invite hams to visit them on the Strs. Webber and Hurley when in Dubuque, Ia. A famous call has just been brought back to its old home town. W9AKN of Minneapolis was granted the call W9ZT. W9EYL has left for a two weeks' vacation. W9FNK is getting reports on his portable call W9ZZA. W9FJK reports the Rag Chewers Club of Minneapolis holds meetings on air Tuesday nights at 8:00 p.m. New ham at Minneapolis is W9HOP. W9COS finds the summer weather excellent — outside the shack. W9DRG has portable, W9HRU, on 7 and 14 mc. W9BN reported direct to Headquarters.

Traffic: W9BN 108, W9GUX 27, W9FJK 25, W9BNN 18, W9CKU 9, W9FAD 6, W9FNK 5, W9AIR 3, W9EYL 2, W9DGE 1, W9COS 1, W9DRG 22.

SOUTH DAKOTA — SCM, Howard T. Cashman, W9DNS — W9FLI had a nice visit from W9HOA, a new Fairfax operator. W9DKJ is moving to Aberdeen. He was visited by W9GQH, and had a nice ragchew with W9DB. W9DES is trying to get a new receiver to oscillate. W9DNS's 2nd op is trying to get his receiver to oscillate somewhat better. W9DNS dropped in on W9DGR and W9CIR. Sioux Falls has a new ham in W9HSH.

Traffic: W9FLI 29, W9DNS 4.

NORTH DAKOTA — SCM, Guy L. Ottinger, W9BVF — The James River Radio Club of Jamestown handled some traffic during the Fair. W9DYA is using the old megger again. W9DGS keeps one schedule with W9FFY. W9DM just returned from a camping trip with the Boy Scouts. There is a new ham in Bathgate, W9HDA. W9BVF is building the pentode receiver as per June *QST*.

Traffic: W9DGS 201, W9BVF 38.

NORTHERN MINNESOTA — SCM, Ray Weihe, W9CTW — W9FQI is leading. W9DOQ reports new stations, W9GYH and W9HDN. W9HIE, a new station in St. Paul, reports new stations W9HKF, W9HRB, W9HRF and W9HQY. W9BBL was heard in England on 3500 kc. W9BVI is a DX hound. W9HDN, a newcomer, reports another new ham. W9GGQ was in a bad accident. W9FAQ had his house painted. W9FNJ is getting ready for fall. W9EHI says not much doing. W9CWI says, "Off-frequency operation will soon be on winter production." Watch your frequencies, gang. W9BRA and W9EGU are on a cruise. W9ADS has a new '52. W9BVH was visiting Headquarters and reported direct from there. The new St. Paul Radio Club

is coming through the summer in great shape. Northern Minnesota now boasts two dandy clubs, the other being the Duluth gang.

Traffic: W9FQI 18, W9DOQ 12, W9HIE 12, W9BBL 8, W9BYI 8, W9HDN 5, W9GGQ 4, W9FAQ 4, W9FNJ 3, W9EHI 2, W9CWI 1.

DELTA DIVISION

TENNESSEE — SCM, James B. Witt, W4SP — W4OI again leads in traffic. W4AFS is back again. W4ADI has no power for transmitter yet. W4AFM has a 'phone going now. W4AAO has portable call W4PBV. There was a big hamfest in Chattanooga July 3rd, 4th and 5th, 16 stations being represented. The night of the 3rd was spent with W4MU at Cleveland and the 4th was spent visiting WDOD and most of the hams in Chattanooga. On the 5th they had a picnic lunch on Signal Mountain near the home of W4LU. The SCM visited our 100% 'phone station, W4AAD. We had a four-way hook-up between W4AAD, W4MU, W4IU and W4ACU.

Traffic: W4OI 51, W4AOI 26, W4CW 22, W4AAD 19, W4AAO 10, W4AFM 2, W4RO 2.

MISSISSIPPI — SCM, William G. Bodker, W5AZV — W5AWP reports that W5TX is on at Corinth. W5BTL has worked Mexico. W5AWP and W5AZV are now OBS. W5VJ has moved his outfit into more spacious quarters. W5BXZ is a new ham in Brookhaven. W5BOT is touring Texas with his portable, W5MC. W5BHL has rebuilt his 3500-kc. 'phone. W5ANI and W5AZV recently visited W5BHV in Monroe, La. Anyone interested in becoming an ORS please drop the SCM a line. W5UM reports working all districts with two type '01-A tubes and B battery supply.

Traffic: W5AWP 32.

HUDSON DIVISION

NEW YORK CITY AND LONG ISLAND — Acting SCM, W. J. Warringer, W2BPQ — The summer slump in for fair now, but don't forget to report even though it is only to request being placed upon the inactive list. By the time this reaches you vacations will be over and traffic should begin to pick up. 3500 kc. is getting better for DX every night. Bronx: W2CYX schedules his kid brother in camp in N. H. W2BGO is promoting a picnic to be held Labor Day in Poughkeepsie. W2LW: For the luv of Pete, make some remarks on those reports, OM. W2APV is still scheduling VP2PA nightly. W2VG goes on inactive list. W2ANE will be on the air soon. The SCM is not having much luck getting a two-letter call. Hi. W2CWP tried 'phone — now going to stick to CW. W2AXL is getting ready for the fall. W2AFT has quit for the summer YLs. Brooklyn: W2AZV worked Ohio with two-watts input. W2PF went to Camp Dix, N. J., with Sig. Corps. W2BRB is writing articles for *QST*. W2BEV has a dynatron now. W2BJF reports a new ham, W2DAS. W2BTH, old W3AF, is with us now. W2BO and W2LB: How about a report, OM? W2BIV should have been in BPL last time. Sorry, OM. Long Island: W2ASS leads the pack. W2AVP is playing papa to W2AST, W2BNW, W2AKL and W2AXV. W2AIQ is letting his tubes cool off. W2BDN has gone to the Argentine. W2BTE, an old-timer, is back. Manhattan: Manhattan Radio Club is going full blast. Write W2BDJ for the dope. Meetings every Friday in the Armory, 168th St. and Broadway. W2BXW is making use of his portable, W2CXQ, on 3500 kc. W2CBB is a new ORS and used his portable, W1ATT, in camp at N. H. W2BNL is running his portable, W2ZZH. W2SC: Will wonders never cease? No traffic this month. W2BDJ is working hard as President of MRC. W2BBY was heard in Germany. W2BUP has a new MG. W2CBW worked a Jap. W2AOU is on vacation. W2CLO is using a '52. W2PO has a new push-pull rig. Dick Coleman and Geo. Neubauer will be real hams soon. W2ATP has been rebitten. W2ADI is using 'phone on 14,000 kc. W2AWT joined MRC. Staten Island: W2WP reports power supply on the blink. W2CEP has gone to Germany for four months. W2CKN has a new antenna now.

Traffic: Bronx — W2CYX 187, W2BGO 47, W2LW 11. Brooklyn — W2AZV 47, W2PF 41, W2BIV 11, W2BRB 3, W2BEV 3, W2BJF 3. Long Island — W2ASS 65, W2AVP 8, W2AIQ 6. Staten Island — W2BTW 26, W2WP 11. Manhattan — W2BXW 14, W2CBB 11, W2CWP 7.

EASTERN NEW YORK — SCM, H. J. Rosenthal. W2QU — W2LU got a lot of competition this month, but managed to keep in the lead. W2BZZ has averaged over 150 messages monthly for some time. W2BJA delivered a death message originating in Salvador. W2CJP is handling traffic between Boy Scout Headquarters and their camp. W2CGO is the proud father of a future YL operator. W2BLU is looking for a cooling system for his tube and himself. W2UL has gone on 3500 kc. to handle Naval Reserve traffic. W2AYK is also handling Naval Reserve traffic on 3500. W2ACD visited Headquarters with Capt. Baldwin of the Army. W2ATM is one of the few stations in New Rochelle still handling traffic on 7 mc. W2CL has a new calibrated receiver to check the off-frequency stations. W2ACB reports very little doing during the summer months. W2CTA is spending the summer in the Canadian Woods. W2OP is at the CMTC for the summer. W2QU has moved to Mamaroneck, N. Y., but the old QRA is still good for report cards.

Traffic: W2LU 191, W2BZZ 185, W2BJA 144, W2CJP 135, W2CGO 49, W2BLU 28, W2ACD 25, W2UL 24, W2ATM 21, W2AYK 22, W2CL 12, W2ACB 10, W2CTA 1.

NORTHERN NEW JERSEY — SCM, A. G. Wester, Jr., W2WR — Your SCM is the proud possessor of a daughter, which is his July report. W2JF is still working on schedules. W2CWR makes his initial report. W2AOS reports all AA schedules off for the summer. W2AGX is hot for working expeditions. W2CJX was QSO Armenia and Cairo. W2BPY is spending most of his time rag chewing. W2MQ has moved to North Bergen, N. J. W2CFY is moving. W2CDQ was QSO VS7GJ in Asia. W2AKC got a great kick QSOing EAR96 and using Spanish only. W2CEX has entered the rebuilding stage. W2AQI spent the month at Plattsburg in the C.M.T. camp. W2BJZ has some nice photos of his station. W2DFM is a new ham in Ridgewood. W2BDD is having trouble stepping out on 14 mc. W2AVK is attending night school. W2CNA will spend August in Maine. W2AH and W2LV are very active on O.O. duties. W2CLX is interested in becoming an ORS. W2CWQ made his first report.

Traffic: W2JF 29, W2AOS 5, W2AGX 2, W2CJX 18, W2BPY 5, W2MQ 124, W2CDQ 5, W2AKC 39, W2AQI 14, W2BJZ 1, W2AVK 1, W2CNA 11, W2CLX 6, W2CWQ 21.

MIDWEST DIVISION

NEBRASKA — SCM, S. C. Wallace, W9FAM — W9BEX carries off the honors again. W9EYE is sure knocking 'em stiff this summer. W9DI is doing FB. W9DMY and W9GRQ are new ORS. W9EEW is going on vacation to N. Y. C. W9EWO reports. W9GDL has opened new radio shop. W9DFR is all set for the big rush this fall. W9FWW says pretty busy nowadays. W9FAM is busy rebuilding. W9EHW says it's too durn hot to pound brass. W9BOQ is busy with farm work. W9BBS says ND on traffic. W9ESY is pounding away. W9GLS handles some traffic each month.

Traffic: W9BEX 219, W9EYE 74, W9DI 51, W9DMY 46, W9GRQ 46, W9EEW 16, W9EWO 15, W9GDL 10, W9DFR 7, W9FWW 1, W9ESY 8.

MISSOURI — SCM, L. B. Laizure, W9RR — Report for June–July 1931, the two months period due to absence of the SCM from home during June: W9FTA reports the following election of officers for the Mississippi Nines Club: W9ECI, President, W9DYJ, Secretary, W9GUC, Treasurer. W9FTA continues as RM. W9DZN asks to have his ORS placed on the inactive list during the summer. W9KR reports several DX records on 14 mc. W9FAB (and perhaps others), who thought an ORS necessary before reports could be turned in, please note that reports may be made by any traffic handling station, whether or not traffic has been handled during the particular month. News is always in order. W9PW is rebuilding for MOPA. W9DYJ says too hot to keep the cans on. W9FYM reports W9FNI and W9GQG new stations in Brunswick. A hamfest was held in June at the boat races near Brunswick: Present, W9FJV and W9AIJ, together with the Brunswick gang. W9BJA has been ill. W9DHF is on 'phone and CW 3.5-mc. band.

W9FVM is building a portable to take to school next fall at Fayetteville, Ark. W9CJB reports that W9FAL lost his father recently. W9EYB returned home from school. W9GJF is rebuilding. W9BGW is high man for both June and July. W9EPX had a visit from W9EPY. Both of these fellows spent the 4th at W9FBF-FSI for a hamfest. W9UI, formerly of Sedalia, visited W9EPX. New stations reported: W9HIZ, Cameron; W9HLK, Gallatin. W9ENF says too hot during July so he couldn't keep up the pace he set in June for traffic. W9BGN is active in passing traffic through St. Joseph. W9DHN reports a new ham, W9GRL. W9AIJ is keeping regular schedule with W5CB. W9HNM is a new station at Marceline. W9EYG built a crystal rig. The SMARA Convention at Rolla, Sept. 11th–12th, should have the attention of all Mo. hams — first affair of its size to be held in that section. U.S.N.R. and A-A will be represented. W9FPI is now on for traffic in Kansas City. W9GBA is on the shelf during hot WX. W9AOG now has a ham extra first ticket. W9CFL is busy with U.S.N.R. W9RR was touring the northwest during June. W9DQN is rebuilding.

Traffic: W9KR 6, W9PW 54, W9DYJ 41, W9FYM 3, W9DHF 8, W9FVM 9, W9CJB 15, W9BGW 424, W9BJA 146, W9ENF 24, W9BGN 13, W9DHN 9, W9AIJ 3, W9EYG 18, W9GBA 6, W9AOG 11. W9BGW 234 (June), W9BJA 105 (June).

IOWA — SCM, Geo. D. Hansen, W9FFD — W9IO takes the lead and reports W9YA on 'phone on 3542 kc. W9BCL follows with a fair total. W9GP says very much "X." W9FFD gets in a few when the cooling fan doesn't QRN too much. W9EJQ is still on deck on 3700 kc. W9ACL reports many new hams in his locality. W9EOP requests place on inactive list till Sept. 15th. W9AHX is trying 14 mc. W9FZO finds 7 mc. getting bad. W9BJP recalls the fact that it is too hot for QSO. W9CWG had hard luck for antenna coming down in a storm. W9DIB is another sufferer of the WX. W9GQI comes through with a starter. W9FWG says still on top. W9EIV is QRL work and vacation. W9FEB is experimenting with antennae. W9FOF will soon hit the ether with a new crystal job. W9EST had hard luck getting a temporary station going for the celebration. Reports from Sioux City indicate there will be a big convention there August 28th and 29th, to which every one is invited.

Traffic: W9IO 80, W9BCL 45, W9GP 31, W9FFD 28, W9EJQ 25, W9ACL 14, W9EOP 14, W9AHX 14, W9FZO 7, W9BJP 4, W9CWG 4, W9DIB 3, W9GQI 2.

KANSAS — SCM J. H. Amis, W9CET — W9CFN has been on U.S.N.R. cruise. W9CXW is attending National Guard camp at Ft. Riley. W9BNX is having trouble with a bad power leak. W9ESL has a report from New Zealand on his 3500-kc. 'phone. W9BTG is going on U.S.N.R. cruise. W9ERR is interested in an ORS appointment. W9ECF is a first reporter. W9HL is rebuilding. RM W9FLG has been taking a vacation. W9EVT, W9CET, W9FRC, W9BTG, and W9ESW will all be in camp with the Kansas National Guard at Fort Riley this month. CU all at Topeka Midwest Division Convention, Sept. 5th and 6th.

Traffic: W9CFN 25, W9CXW 16, W9BNX 16, W9ESL15, W9BTG 14, W9ERR 11, W9ECF 6.

NEW ENGLAND DIVISION

RHODE ISLAND — SCM, N. H. Miller, W1AWE — W1MO was QSO WDDE on 14,150 kc. W1ATM is getting along in FB shape. W1CAB is rebuilding for U.S.N.R. drills next fall. W1AWE was QSO 45 foreigners this month. W1BUX worked VP2PA, G, F, CX, PA, SM, D, and PY's. W1BCZ is going strong on 7 mc. W1BES is building an FB 3.5 -mc.' phone. W1II is in the hospital, so im't on so much now. W1TQ is QRL the girl friend's. W1GR has an FB 'phone on 14 mc. W1BDQ is still operating with W1ID at WEAN. W1EX is on the 3.5-mc. band daily. W1ARK is no friend of the ice man, as he is servicing electric refrigerators. W1AAD is using a loop receiver. W1ASZ has a new A.C. receiver. He reports a new ham in Pawtucket, W1CGO. W1AMU is rebuilding WPAW. W1CPV is going strong on 7 mc. W1DW at Apponaug is still DXing. W1BQD is troubled with the heat. W1MG is on 14 mc. W1CDI and W1TZ of Pascoag are both on 3.5 mc. Don't forget to report to SCM on the 16th.

Traffic: W1ATM 12, W1MO 8, W1ASZ 8, W1AMU 8, W1CAB 7, W1AWE 6, W1AAD 4, W1BUX 4.

CONNECTICUT — SCM, Fred A. Ells, Jr., W1CTI — W1MK crashes through with a BPL total. W1ES schedules WSCMP and VE2BB. W1BDI schedules WCEN on 7100 kc. W1APJ in connection with W1ASD scheduled Camp Cross and Niantic. W1BEO worked the sixth district on 3800 kc. W1AZG heard FX on 14,000 kc. and reports for W1AKI. W1BHM works plenty of DX on 14,300 kc. W1QV has a new Junior op. W1BNB installed a new power supply. W1AVB handled his in one week. W1BBJ is too busy to be on the air much. W1ASP has rebuilt. W1AFB reports a new ham in Hartford, W1CFY. W1HQ schedules FX. He reports a new station, W1BWL, in Milford. W1AMQ won a 211-E in Army-Amateur Contest. He reports a new one in Milford, W1CPN. W1AOK applies for ORS. W1BVW has returned from Army Signal School. W1AMG has moved to Stamford. W1HD is on 56 mc. W1TD says QRM and the garden keep him off the air. W1BBU is looking for nearby hams to keep him company on 56 mc. W1AAM says he will try to report regularly. W1CBA is making lots of noise with their 50-watt MOPA. W1FL is rebuilding. W1ADJ has rebuilt into P.P. M.O.-P.P. P.A. W1CTI is still QRL pounding nails and pushing a paint brush. New ORS this month are W1ASP and W1AZG.

Traffic: W1MK 319, W1ES 50, W1BDI 45, W1APJ 44, W1BEO 34, W1AZG 29, W1BHM 24 ,W1QV 21, W1BNB 21, W1AVB 21, W1BBJ 14, W1ASP 13, W1AFB 10, W1HQ 10, W1AMQ 8, W1AKI 7, W1AOK 7, W1BVW 7, W1ADJ 2, W1UE 9.

EASTERN MASSACHUSETTS — SCM, Miles W. Weeks, W1WV — W1ABG is trying 28 and 56 mc. W1ATX was off the air during July. W1CGB is a new ham in Melrose. W1ME is now using MOPA. W1BJM starts reporting. W1KH was QSO RX1AA for his 50th country. W1WV has been off due to business QRM. W1BFR has a schedule with W1HK at Camp Devens. W1BNJ kept a schedule with RR5P, a ship bound for Rotterdam, and had a chat with a schoolmate of his, via CE1AI. W1BGW makes BPL on deliveries. W1BZQ has been appointed O.O. W1AAL has been on vacation. W1BXB handled traffic on schedule with WCEN. W1WU has a 7-mc. schedule with W1ARG. W1ACH has been away on vacation. W1AFP visited W1MK and W1ES. W1CHR-W1BOV reports his portable working FB with inside aerial at Nonquitt. W1CQN continues several 3.5-mc. schedules. W1ACD is driving an ice truck this summer. W1ASI handled more traffic than usual. W1CCP hopes to go to sea soon. Summer WX bothers W1ADK's traffic. W1AKY had a visit from W1BFU. W1ANK is back in Gloucester.

Traffic: W1BGW 83, W1ASI 62, W1KH 49, W1BZQ 32, W1BFR 19, W1BNJ 18, W1AAL 15, W1BXB 13, W1ME 10, W1BJM 9, W1WV 7, W1ATX 7, W1WU 6, W1AFP 6, W1CQN 5, W1CCP 5, W1ACD 1, W1ADK 1.

MAINE — SCM, J. W. Singleton, W1CDX — W1BEZ, a new O.R.S., leads the list this month. W1ATO comes next with a very fine total. W1BLI has a good string. W1BEU reports two new amateurs in Waterville, W1CKK and

W1CKZ. W1BOF has received an O.R.S. appointment. W1ANH says he is rebuilding his house. W1AFA handles a few now and then. W1BFA reports a new man, W1CKY in North Berwick. W1BTG sends in his first report. W1AQW is busy rebuilding. W1EF led Maine with 288 points in the International Relay Contest. FB. W1AQL is QRL baseball and work on the new quarters of the Queen City Radio Club. W1AFR is publicity manager of the Portland Amateur Wireless Association, and is responsible for the amateur page in the Portland Sunday *Telegram*. W1BWO has been appointed O.R.S. Until further notice the SCM will be located at Machias, Me. The Maine men will be sorry to learn that W1BIG is leaving the Section and is going to New Jersey for a while. Good luck, Fred, and we hope you will come back to us.

Traffic: W1BEZ 86, W1CDX 72, W1ATO 63, W1BLI 59, W1BEU 27, W1BOF 21, W1ANH 16, W1AFA 12, W1BFA 2, W1BTG 1.

WESTERN MASSACHUSETTS — SCM, Leo R. Peloquin, W1JV — O.R.S. appointments are still in order. W1BUP is back after a stay in the hospital. W1NS is in the process of rebuilding. W1AZW built a push-pull transmitter. W1AIF is working in Boston for the summer. W1BVR keeps two schedules a week. W1BSJ is building a 56-mc. transmitter and receiver. W1ZB is adding power amplifier using two '60s and 3000 volts on the plates. W1AJD is off the air due to working overtime. W1APL is getting ready for fall traffic. W1BNL is moving to new location. W1ASU is on vacation. W1ASY is on the air with a brand-new transmitter.

Traffic: W1ASY 84, W1ASU 74, W1BUP 20, W1BVR 18, W1AZW 16, W1BNL 11, W1JV 9, W1BSJ 8, W1BWY 6, W1APL 6, W1ZB 1.

NEW HAMPSHIRE — SCM, V. W. Hodge, W1ATJ — The following new stations were reported this month: W1CGH, Dover; W1CJO, N. Charlestown; W1BAB, Woodsville; W1BFY (ex-W1CAZ), Claremont Jct. W1APK says everything's quiet. W1AEF is building an AC receiver. W1CCM is waiting for his MD's OK to go on the air. W1BLA is working on a new transmitter. W1AUY says weather too nice to stay in shack! W1LY is rebuilding his receiver. W1BAC pounds the key when he can stay away from the YLs. Hi. W1IP is out for DX for a while. He reports a new ham in Manchester, W1CBB. W1AXL is trying 'phone. W1BST is now in Laconia. W1AVJ has gone back to CW.

Traffic: W1APK 43, W1AXL 4, W1BFY 2, W1AUY 1, W1BLA 1.

VERMONT — SCM, C. A. Paulette, W1IT — W1BJP is high traffic man this month. W1BD reports that W1BJP called on him. W1AOA is QRL with work. W1ATF reports W1AWH, W1AXN and W1BJP as visitors at his station. W1AXN called on W1BNS, W1ATF and W1CBW. W1AVO, who is also W9BSR, is at Mt. View House at Essex Center, Vt. Hope you enjoy your stay here in our State, OM. W1AEA has only been on the air since January 1930, and has been heard in England on 'phone with only 6 watts of power input. My resignation as SCM goes in with this report, as I am so QRL I can't possibly do you all justice. Very 73.

Traffic: W1BJP 24, W1ATF 18, W1AOA 9, W1BD 7, W1AVO 7, W1AXN 6.

NORTHWESTERN DIVISION

IDAHO — Acting SCM, Harold Hagen, W7AUR — W7AFT says that his line voltage is very uncertain. W7BHQ is a new ham at Jerome. W7ACP has a new Pentode receiver. W7AYH is remodeling his crystal rig. W7AIH has been working some real DX on 14 mc. W7KG has just installed a pair of '66s. W7BGJ is a new ham in Boise. W7ACD has a portable transmitter built in a lunch box. W7QD is doing a classy job on his new crystal rig. W7AKZ is spending his vacation on the coast. W7ALW will be on soon with a new 'phone layout. W7AUR is a new ORS in Sandpoint.

Traffic: W7ACP 56, W7AYH 21, W7AFT 5, W7ACD 3, W7KG 2, W7AUR 20.

OREGON — Acting SCM, W. S. Claypool, W7UN — W7ALM is doing a wholesale business with traffic to the Orient. W7BGX, portable at the Model Boat and Hobby Show held over the fourth of July in Coos Bay, originated some very nice traffic. Operators at the booth were W7IF, W7MY, W7APE, W7AWO, W7AJX, W7AHJ, W7AMF and W7WL. W7AMF keeps many fine schedules. W7ED keeps up his usual good work. W7QY is kept busy with U.S.N.R. W7AYJ handles a nice pile from Camp Clatsop. W7UX works 7 mc. with fair results. W7WL is installing new '60. W7ATC is with us again. W7PE is still with us. W7ZD says the summer weather has got him. W7WR is rebuilding power supply. W7EO has new license.

Traffic: W7ALM 302, W7BGX 223, W7AMF 163, W7ED 135, W7QY 100, W7AYJ 66, W7UX 57, W7WL 43, W7ATC 36, W7PE 22, W7ZD 11, W7AHJ 17, W7AJX 9, W7WR 3.

WASHINGTON — SCM, Eugene A. Piety, W7ACS — W7QI breaks loose and makes the BPL. W7KZ got his traffic from the yacht races. A new 75-watt job is going in at W7AIT. W7AG continues to spend his time rag chewing. W7RT finally got going again with an '80 for supply. W7TX is in California visiting W6TC, ex-W7LZ. W7HE is still operating on a boat in Alaska. W7AIU is a new 'phone man. W7CN tried CW and is planning to rebuild everything. W7DL is president of Seattle Radio Club now. W7IA takes W7FJ's place at Kirkland for DX records. W7JB hears lots of DX. W7ARI and W6CVZ paid W7RT a visit recently. W7WG is out in the country working. W7TS is still seeing the world through a port hole. W7DL and W7ASY are putting pressure to bear to make Seattle "crystal conscious!" W7AY and W7AFE work in a bag factory. W7ACB sends in his first report for years. The first report from W7VP is received. W7APS sends in a business-like report. An '03A keeps W7ATH busy. W7AVM is new ORS. W7ADR is busy on 3500-kc. 'phone. W7BCF is a new ham in Hoquiam. W7BBN, W7BBZ, W7AYX are new hams in Aberdeen. W7AZA worked his first VK. W7AYY is on the Naval Reserve cruise. W7TZ is back on the air. W7AXL has a new M.O.P.A. working. W7BIF is the call of the station of the Naval Reserve in Hoquiam. W7BCF is busy working summer DX. W7ANI is home in Puyallup. W7AMB has a traffic complex. W7AVE says that he is the Western Key Station of the Esperanto Communication Network. W7OI has trouble from local 'phone QRM. W7BEH is at C.M.T.C. and helps to op W7OI. W7AYO takes the lead in traffic in Yakima. W7AUI, W7BCS, W7AUC are new hams in Yakima. The Radio Club of Yakima has new club rooms and they are all getting ready for the convention. W7FJ reports that the reports from his motor boat interest him more than QRK reports. W7TK handled some traffic from the Coos Bay Hobby Show. W7AIL is a new ham in Everett. W7MX is busy picking berries. W7AVN is building a cabin cruiser. W7ABN is busy with NN work. W7ANP is on the Navy cruise. W7ASL keeps NDQ running. Let's keep up these fine reports, fellows.

Traffic: W7QI 107, W7KZ 82, W7AIT 65, W7AYO 53, W7APS 46, W7ANF 21, W7TK 21, W7AG 16, W7AVM 14, W7VP 11, W7BCS 11, W7ADS 10, W7ACB 10, W7OI 9, W7AVN 8, W7AMB 8, W7AVE 7, W7IC 6, W7AQ 6, W7AUI 6, W7AXL 5, W7ARI 4, W7RT 2, W7ANI 2, W7AUC 2, W7FJ 1.

ALASKA — SCM, W. B. Wilson, WWDN — This report was received by radio at W7AZQ from K7AQC and mailed to Hqs. Miss Osterback, K7ANQ, uses two fifties with MG supply. Judge Driffied, K7QS, Ex7EP, works on 7 mc. K7ASM, Anchorage, keeps 3.5-mc. schedule with K7SO, Dundas Bay, who uses '01A with spark coil supply. K7TF, Craig, and K7ATD, Cape Spencer, are both building Push-Pull rigs. K7FF, Chomley, has '52 on 7 mc. K7AIF, Nelson Lagoon, works the States on 3.5 mc. K7AQC, Cape Decision, reports 3.5 mc. much more reliable than 7 mc. this year.

Traffic: K7AQC 12.

PACIFIC DIVISION

EAST BAY — SCM, J. Walter Frates, W6CZR — Traffic totals for the Section went soaring this month due to the exceptional work of two outstanding stations. W6ASH is at the head of the list again with a staggering

total. A lot of his traffic came from W6CNG, the station of the local unit of the California National Guard, operated from the summer training camp by OM W6BTZ and a couple of East Bay hams. W6CNG worked a few other stations besides W6ASH and had the second best total for the month. W6BTZ at the Guard camp at San Luis Obispo was assisted by W6AIN and W6BKM. They gave the majority of their traffic to W6ASH with W6SC in San Francisco second. Other stations worked were W6CSF, W6ZX, W6ZM, W6CDP, and W6ALX. Through the coöperation of W6CDP two-way communication between W6AIN and W6BKM's folks was often established. W6CIQ reports that he handled traffic from W6ASH from the Berkeley Scout camp. W6RJ visited the Coos Bay Amateur Radio Club at North Bend, Ore. W6FCO sent in a fine batch of traffic. W6CIE finished well up among the leaders. W6CYD ran him a close second. W6AQO managed to find time for traffic. W6DTT hammered away in telling fashion. W6ATJ hied himself away on a vacation. W6CDP worked HH7C. W6BKM managed to handle some traffic of his own in spite of the fact that he was at the National Guard camp. W6BI is still pounding away with U.S.N.R. work and being RM for Berkeley. W6FCN shot in another of his moderately large traffic totals. W6ZM has been busy gathering up prizes for the coming tri-section hamfest, and putting out his RM's bulletin. W6ALX fell down for the first time in months. He has been helped a bit by old W6DDA, who is spending a few weeks ashore from his Canal running scow. W6FAJ handled a few messages from KGEG. W6BZU still manages to rap out his traffic. W6ACD succeeded in handling three messages. W6EG sent in a report this month. W6AUT is waiting for his vacation so that he can take a new examination. W6CZN is getting out plans and specifications for two reinforced concrete bridges. W6CDA is using 'phone entirely now. W6ZD went north this month on a special Naval cruise to Alaska. W6CUM is due back from Alaska almost any time.

Traffic: W6ASH 1450, W6CNG 606, W6CIQ 167, W6RJ 146, W6FCO 145, W6CIE 99, W6CYD 92, W6AQO 78, W6DTT 67, W6ATJ 57, W6CDP 56, W6BKM 42, W6BI 41, W6FCN 41, W6ZM 34, W6ALX 24, W6FAJ 11, W6BZU 11, W6ACD 3, W6EG 2.

SANTA CLARA VALLEY — SCM, F. J. Quement, W6NX — Trans-Pacific traffic continues to move each morning — W6DMJ, W6BET and W6AMM admirably handling this important traffic. Approximately 700 messages were trans-pacific this month. This important traffic is certainly in "the interest, convenience or necessity" of the public and fulfills the licensing requirement to the letter. W6DMJ mails all his messages via air-mail offering 48-hour service from PI to East Coast. W6BHY handled press from Alaska. W6BET will soon have his ½-kw. set going. W6FBW, new ORS, and W6BMW, together with W6ALW continue to help swell the traffic totals. W6DCP built Hull's Pentode receiver with good results. W6BQY is new reporting station. W6BPT and W6CLV are active. W6BEN and W6DEQ (twin brothers) are first and second ops on *President Polk*. W6NX is using the new d.c. heater type auto tubes — they are FB.

Traffic: W6DMJ 518, W6AMM 162, W6BHY 98, W6BET 64, W6FBW 35, W6BMW 44, W6ALW 42, W1DCP 1, W6BQY 4, W6BPT 6, W6CLV 34.

ARIZONA — SCM, Ernest Mendoza, W6BJF — W6CKW is in Los Angeles temporarily. W6AAM was in Colorado the past month. Ex-6EAA is kept busy between KTAR and a dancing instructor! W6CWI is going to Camp Perry, Ohio with the National Guard team. W6BCD is in Arkansas on vacation. W6DTU returned from two years in college in Tennessee. W6EEB is now chief operator at KGUP, replacing W6BWS who was promoted to assistant dispatcher at a Cincinnati, Ohio airport. W6AEK has moved from Phoenix to Prescott. W6DRE is busy at KOY. W6EFC, W6AND, W6DXC and W6COI has just joined regimental headquarters company, Ariz National Guard, where W6CDU is technical sgt., and W6BJF is sgt. W6DHW and family are newcomers at Tucson. W6BJF is the proud owner of a Sweepstakes Certificate, an International Relay Competitio:. Certificate, and an SCM appointment certificate. Mrs. W6CEC is taking code instruction at W6BJF. W6DIE now has a second-class commercial ticket. W6EUT and W6EFC make the BPL this month. W6CDU QRA now P. O. Box 1773, Phoenix. His "OW" is working hams daily. W6CEC will try 56 mc. W6BLP had a visit from W6DWP and W6BJF. W6AMV deserted the key for 'phone. W6EJN has made several trips to W6CEC lately. W6ATR has been transferred from Superior to Phoenix. W6EFC has rebuilt his receiver using 2-volt tubes. W6AND has a 50 watter with crystal coming up soon. W6DVJ is a new man at Peoria. Ex-6DWP is wondering if the R.I. will ever keep his promise to come to Phoenix. W6UP handled 145 messages in 15 days. W6CFG (portable) finally got his "6COI" renewed. W6CPF will be dismantled and inactive 'till first of September. W6EUT is high traffic man this month. W6EUT, W6EJN and W6COI have been appointed ORS. W6CCN expects to get on air at his new home. W6CVR is heard on the air occasionally. W6HS is Central Arizona Route Manager. W6BMJ and W6CQF are two new men at Tucson. I want to thank the gang for electing me SCM. I will do my best if you coöperate by sending in your reports every month. Let's have more reports next month. Mail to 1434 East Madison St., Phoenix, the 16th of every month.

Traffic: W6EUT 253, W6EFC 209, W6BJF 156, W6UP 145, W6CDU 79, W6CPF 52, W6CFG 48, W6CEC 47, W6EJN 15, W6AMV 8, W6BLP 6, W6DVJ 1.

SACRAMENTO VALLEY — SCM, Paul S. Farrelle, W6AXM — W6AIM says that W6BEV flunked in the test and lost his license. W6ADS is now WAC having worked Tunis, Africa. W6EOC added a P.P. stage to his crystal 'phone. W6DKW is waiting for equipment from the U.S.N.R. We made a mistake in the last report and stated that W6EEN was general janitor of KFBK. We find out he is the big shot there. Hi. Your SCM was honored by visits from W9BHE from Nebraska and W8BFS of Binghamton, N. Y. Seen at the National Guard Camp were W6AID as a mule skinner, W6DYF as a radio sergeant and W6AXM as 79th Brigade radio chief.

Traffic: W6AIM 9.

SAN FRANCISCO — SCM, C. Bane, W6WB — W6AVH makes BPL both ways. W6EKC pops up with his usual nice total. W6DFR says the A-A system, Ninth Corps Area now boasts of 135 members. W6SC sends in one of his rare reports. W6ZS reports as usual. W6BVL startles us by handing in a very fine report. W6CAL says not much traffic due partially to work. W6KJ kids the SCM about his singing. Hi! W6CIS says he is operating his own set while W6ZS is rebuilding. W6ABB is now the proud possessor of a commercial ticket. W6ERK reports again. W6DZZ has been appointed Route Manager. W6DXT and W6ADK report for the first time. Any inquiries regarding the convention should be addressed to W6PW, W6WB or W6ETR. Bill Tracy, W6AKU has charge of ticket sales. See him, gang.

Traffic: W6AVH 400, W6EKC 215, W6DFR 165, W6SC 116, W6ZS 116, W6BVL 40, W6CAL 27, W6KJ 18, W6CIS 9, W6ABB 4, W6ERK 57, W6ADK 33, W6DXT 23.

SAN JOAQUIN VALLEY — SCM, E. J. Beall, W6BVY — W6AOA maintains four schedules, W6ASH, W6ETJ, W6EUT and W6DAM. W6BQC may be heard using his new portable call, W6BHJ. W6CLP finds 3.5 mc. still best band for rag-chewing. W6BJE intends to start off with a good receiver in the fall. W6ETN is also busy with his receiver. W6BUZ is forced to lay off for the summer. W6FFP says if more QSP stations on he could double traffic report. W6SF sold out to W6DZN, old spark 6LU. W6FAN can be heard on 14 mc. W6BBC has everything for '52 Hartley job. W6DTJ is on with two 50 watters. W6EFV late from Fresno is now in Stockton. W6BTF is open for orders for crystals for 7000. W6SF is the RM in the Stockton territory. W6QA, our Section RM, received word that his job, that of OP at the Agriculture Station in Modesto, will probably be shifted to other parts of the State so we may lose him. W6BVY will move into his new home and Radio-shack about August first. W6WA leaves for a tour through the east in August. I'll see you all at the Pacific Division Convention in San Francisco in September.

Traffic: W6CXT 47, W6DZN 73, W6FAN 21, W6BBC

28, W6SF 123, W6FFP 220, W6BUZ 6, W6EKH 7,W6CLP 4, W6BQC 176, W6DQV 26, W6AOA 1124, W6BVY 66.

LOS ANGELES — SCM, H. E. Nahmens, W6HT — *Seventy* reporting stations are responsible for the splendid total this month. To maintain this total the SCM needs YOUR report, OM. Send it in on the 16th. ELEVEN men make the BPL! W6EGH, W6SN, W6DWG, W6CFN, W6AOR, W6DER, W6YAU, W6BPO, W6ETJ, W6ARY and W6VH. The first SEVEN make it both ways! It's a walk-away for W6EGH with W6BPO second and W6SN a close third. W6ETJ shoved out plenty of La Fiesta traffic. Portable W6DWG at Boy Scout Camp helped cause along by keeping schedule with W6ARY. W6CFN is commander of Unit 2, Section 2, U.S.N.R. W6DER enjoyed Naval Reserve cruise. W6YAU promises even higher total next month. Great volume of traffic kept W6VH busy renewing relay contacts. W6BCK now sports a handsome but practically useless commercial ticket. W6EIF finally put all that power to work and handled some traffic. Had to practically rewrite report to include totals of W6BPO and W6AOR which arrived at last minute. W6CUH got RS from EAR96, his 52nd country! Click with W6AKW for a good rag chew. W6DOZ and W6CIX were badly sunburned while visiting W6CUH! W6HT just returned from vacation in same condition. W6ERL pounded a '10 tube flat with La Fiesta traffic. W6AM had to build special filament transformer to change his 6-phase plate supply to bridge 6 phase. W6UJ swelters while his family enjoy WX at Long Beach. W6CUZ visited northern hams on his vacation. W6ALQ is pulling for the "flag" by arranging schedules for fall traffic. W6FEX has new QRA. W6DEP changed back to TPTG. W6DVA spent the summer yachting. W6AIQ is rooting for the banner! W6DZF is now equipped with all modern ham appurtenances. W6AWY sends report by Western Union. W6DLI at sea most of month. The Amateur Radio Club of Reno showed W6WO around while there. 14 mc. DX has W6ACL and W6ESA under its spell. The lack of cash keeps W6DZI from ending the depression for radio stores. W6LN was QSO CE3DE on 7 mc. W6FBU, W6DDK and W6CAE home from Stanford doing their bit for the Section. W6ON will soon be on 3.5 mc. with 250 watt crystal. W6AZL says the secret of MOPA d.c. is in size of amplifier grid choke. Hot weather took pep out of W6AKD. New elements in slop jars gave W6CVV better note. W6DNA reports W6ESO a new station in Lancaster. W6DWW back from vacation rarin' to go! W6EKS busy as usual grinding crystals. W6DQI has new QRA. Since Don Wallace became District Manager for Kolster Radio, Inc. W6ZZA is busier than ever. W6MA enjoyed trip to New York with W6AM. W6BUX is a new ORS in Pomona from East Bay Section. W6AEO promises big total next month. Mumps and whooping cough from the cat to the housekeeper held up production at W6MK. W6VO gave splendid account of IPH experiences at last meeting of Pasadena Short Wave Club. While on vacation the SCM visited the Hollywood Short Wave Club and the Riverside Radio Club. The latter club meets the first Friday of each month and has possibilities of becoming one of the best in the Section. A Radio Club is now active in Glendale with eighteen members. The following men are now in line for ORS: W6SN, W6EQW, W6ETM, W6BVZ, W6EZK, W6EWI, W6TN, W6ANN, W6CMU and W6DLV. Reports received from W6CZT, W6AIX, W6DBE, W6EHP, W6CPJ, W6EBK, W6FDE, W6CZO, W6BYF, W6BUI, W6EWK, W6EQD, W6DH. Flash — W6ATE presented her OM, W6AWY, with a 11 pound junior op! W6BGF now located at Pacific Palisades, Calif.

Traffic: W6EGH 806, W6BPO 467, W6SN 453, W6AOR 315, W6ETJ 282, W6DWG 247, W6CFN 241, W6DER 207, W6YAU 206, W6VH 206, W6ARY 196, W6HT 163, W6BCK 141, W6EIF 135, W6CUH 110, W6AKW 91, W6AIX 65, W6CIX 61, W6CZT 57, W6DBE 56, W6ERL 49, W6EQW 46, W6AM 45, W6DEP 41, W6DH 40, W6UJ 39, W6CVZ 39, W6ALQ 35, W6FEX 34, W6ETM 34, W6BVZ 31, W6DVA 28, W6EZK 27, W6AIQ 25, W6CPJ 24, W6EBK 22, W6EWI 21, W6DZF 20, W6FDE 20, W6AWY 20, W6DLI 20, W6CZO 19, W6WO 18, W6ACL 16, W6ESA 15, W6DZI 15, W6TN 14, W6LN 14, W6FBU 13, W6BYF 11, W6ON 10, W6DOZ 8, W6ANN 8, W6AZL 7, W6AKD 5, W6CMU 5, W6CVV 4, W6DNA 4, W6DWW 4, W6BUI 4, W6DLV 4, W6EWK 2, W6EQD 2, W6EKS 1, W6DZK 1, W6EHP 1, W6DQI 1, W6ZZA 1, W6BGF 3L

NEVADA — SCM, Keston L. Ramsey, W6EAD — W6AJP is high man again this month. W6UO is working Army Amateur schedules. W6CRF is still on 'phone. W6EAD is about to go back on air.

Traffic: W6AJP 143, W6UO 20.

SAN DIEGO — SCM, H. A. Ambler, W6EOP — W6BGL leads the section this month. He reports a visit from W6CKW from Ajo, Ariz. W6BAM and W6EBX say traffic is picking up. W6ACJ left for a 15-day training cruise on the U.S.S. *Buchanan*. Others on the same cruise are W6ESS and W5TV. W6ADC blew up his '81s. W6EMA is very QRL with YLs. W6BKX has his new set going now. W6AEP has trouble with high voltage surges. W6EZP has a new '10 now. W6ELS is a new ham in San Diego. W6AXV has been rebuilding. W6EOS has been on vacation. W6CTP says the most exciting thing there was when he received the Sweepstakes Certificate. W6AYK has his new a.c. receiver about done. W6BFE has a new MOPA. W6EPF has left on a vacation. All ORS but three reported this month. The hams in the Groosmont district got together and organized a club which meets every other week. All hams in that section should get in touch with W6EPW, V. A. Milton, and help the club along.

Traffic: W6BGL 35, W6BAM 17, W6ACJ 15, W6EBX 13, W6ADC 9, W6EMA 7, W6BKX 7, W6AEP 5, W6EZP 4, W6ELS 4, W6EOP 4.

PHILIPPINES — Acting SCM, John R. Schultz, KA1JR — This report received by radio at W6BET from KA1JR and mailed to HQS. Amateur stations at Guam are exceedingly active. OM1TB has applied for WAC certificate. KA1HR has high total for P.I. OM2CS will turn to 14 mc. soon. OM1CB is rebuilding. OM1FO is going strong with poor rectifier. OM2RC has had good luck on 'phone. OM2SX is after traffic. OM1CS will be on air soon. OM2LD moved. KA1ZC desires schedule with Pacific Coast on Friday and Saturday. KA1JM keeps on rag chewing. KA1JR applied for WAC certificate. P.I. Section strong for Clair Foster for next Director. Individual members wishing to vote are requesting Headquarters to send ballots for the coming election. KA1SL reported by radio to HQs via W6AMM.

Traffic: OM1TB 1515, KA1HR 691, OM2CS 127, OM1FO 100, KA1JR 42, KA1SL 350.

HAWAII — SCM, L. A. Walworth, K6CIB — This report received from K6COG by radio at W6ARE and mailed to HQs. Received too late for inclusion in traffic summary. Mr. Pickle of KGMB announced that he is now a full-fledged ham with call of K6BVZ. W6CBJ of San Diego, Calif., lives in Honolulu now. K6CRW and wife are to spend vacation at Walworth's home. Late in August K6CRW and K6CIB will climb Kilawea for some high-frequency testing at 10,000 foot elevation with portable rig. K6CXY is hooking up low powered 'phone. K6EQM is building new crystal rig now. K6FCX, K6DV and K6COG make the BPL.

Traffic: K6FCX 601, K6DV 524, K6COG 204, K6BOE 165, K6FEZ 103, K6ERH 39, K6ERO 10, K6ENH 9.

ROANOKE DIVISION

WEST VIRGINIA — SCM, C. S. Hoffman, Jr., W8HD — Greetings to the gang, and hope our associations will be as pleasant as those some years ago. Remember, this is your space. Therefore send in a report each month. W8OK will be with the National Guard Camp, call CV6 or CV4. W8CAY reports some of his Navy Net gang will be there, too. W8BTV and W8BOW are on Eastern trip. W8DPO got his Certificate for highest score in state in International Contest. W8CDV is doing most of his work on 14 mc. W8BWK is rebuilding for P-P. W8HD had a nice visit at W8DNX. W8ETX is new station in Wheeling. Say, gang, did you know Old 8VJ is now W4AFM? Would like to hear from W8DPD, W8DNN, W8IB and W4AFM. The Ohio Valley Radio Amateur Assn. at Wheeling is making quite a hit. Drop in when in the city, gang. W8DPO is Secy.

Traffic: W8OK 37, W8DPO 24, W8HD 21, W8BOW 15, W8BTV 10, W8CAY 10.

VIRGINIA — SCM, J. F. Wohlford, W3CA — Lieut. Wilson, U.S.N.R. of Norfolk, has organized Naval Reserve communication units in Richmond, Lynchburg and Roanoke. Any hams in these sections who would like to join, get in touch with Lieut. Wilson, Bob Eubank or the SCM. W3ARU says the moonlight and YLs have just about put him out of the running. W3BRA sends in a report for some of the Norfolk gang. W3BRL doesn't like low power and can't afford high power. W3BRK is still adding wall paper to his shack. W3BRQ leads the Norfolk section in traffic. W3NT is trying 'phone. W3BRA, W3BRL and W3BRQ are building a 250-watter for the reserve unit at Norfolk. W3AQK is having trouble with crystal-control job. W3CXM reported by radio to Hqs. W3MK is working in Newport News and can be worked via W3AJA. W3BLU continues to hand in a good traffic report. W3BGS has been off on account of illness. W3BTR, ex-W3KG, got married in June. W3BSB is Ex-3FG. W3AGH was QSO VOZ recently. W3AAJ has been touring around the state. W3AEW won '61 tube at Danville hamfest. W3FJ is using two '47 tubes in TNT push-pull. W3FE is using a two-bit '45 tube in his transmitter. W3AVU is serving as director of Y.M.C.A. camp. W3BSE and W3BRY are new stations at Lynchburg. W3ABS is at Camp Virginia, near Goshen. W3ZA attended the meeting at Roanoke organizing the Naval Reserve Unit. W3AGY visited in Richmond. W3WO also attended the Naval Reserve meeting in Roanoke. W3BAZ has schedules with W3AGH and W3WO. W3BDZ will be on again with code in addition to 'phone. W3BUR is a new station in Roanoke. W3CA has finished the transmitter. W3BZ is doing a little work. Some of you fellows out around Bristol and Norton, let's have that report you promised some time ago! W3RZ and W3FF enlisted in U.S.N.R.

Traffic: W3AEW 379, W3CXM 196, W3AGH 151, W3BLU 115, W3WO 98, W3ARU 85, W3FJ 46, W3BRQ 31, W3ABS 24, W3AAJ 16, W3BAZ 15, W3NT 9, W3BRA 8, W3ZA 7, W3BRY 4.

NORTH CAROLINA — SCM, H. L. Caveness, W4DW — W4AIS tops the list for traffic handling. W4AKC will be a student at State College in September. W4AEL says that his traffic total is inversely proportional to the temperature in his shack. W4JR still has his hands full with WSOC. W4RE has been working some good DX on 14 mc. W4DQ has hopes of having a crystal going before winter. So did W4DW, but after building and rebuilding four times, he pushed it into the corner and admits temporary defeat. W4BV has been receiving foreign "heard" cards, and so has W4EG. W4ABW has rebuilt. W4TU burned out his transformer and his license expired. W4AAE is considering entering the Gulf Radio School and becoming a commercial operator. W4PBN is on the air almost nightly. The Winston-Salem crowd is busy arranging the details for the Convention on September 25th and 26th. The Club has put two more new men on the air, namely, W4ZN and W4IY. W4OG is planning an MOPA. W4IF has built a frequency meter. W4ABT, the Headknocker of the Convention, is on the air nightly at seven o'clock and will receive requests for reservations. He says the Convention promises to be the best in the history of the Division; that everybody is going to be there, and that YLs are to be admitted at half price!

Traffic: W4AIS 149, W4AKC 30, W4DW 26, W4AEL 25, W4PBN 20, W4AAE 14, W4OG 7, W4RE 7, W4ABT 6, W4TU 3, W4IF 2.

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, E. C. Stockman, W9ESA — W9FYY takes traffic honors this month. W9DNT, W9EDM, W9FQJ and W9FQK handled traffic for Rodeo Show. W9HEM has temporary license. W9PO is on with '45. W9GOX visited W9EAM. W9DTY is back from school. W9HHP is new station at Salida. W9HGS is in operation at Camp Audubon; Ward, operator, W5ARV. W9APZ is off temporarily. W9EFP says it's too hot for radio. W9FXQ has moved to Holdridge, Nebr. W9CSR had some hard luck with receiver.

Traffic: W9FYY 94, W9DNP 61, W9HJS 48, W9DQD 19, W9DNT 16, W9JB 9, W9CDE 8, W9HGS 2, W9FXQ 1.

UTAH-WYOMING — SCM, C. R. Miller, W6DPJ — The annual outing of the Utah Amateur Radio Club was held at Saratoga Springs, Utah, on July 19th. An excellent program, including a hunt for a hidden transmitter, was thoroughly enjoyed by more than 25 of the fellows. In addition to taking traffic honors, W6DAM worked lots of DX this month. W7AHW is holding the fort in Wyoming. W6CNX has joined the A.A.R.S. net. W6EWW has a pair of '52s in push-pull MOPA. W7AAH will soon have a 1.75-mc. 'phone set. W6BTX sends greetings to the gang from Berkeley, Calif. W6EYS is another recruit to the A.A.R.S. net. W6DPO has been rebuilding again. W6BSE worked Guam with his '45s. W6APM is a new station in Provo, Utah. W6DPJ finally completed W6ZZZ.

Traffic: W6DAM 160, W7AHW 49, W6DPJ 34, W6CNX 21, W6EWW 15, W7AAH 7, W6DPO 7, W6BSE 2, W7AWZ 1.

SOUTHEASTERN DIVISION

ALABAMA — SCM, Robert E. Troy, Jr., W4AHP — W4KP is now an O.B.S. W4AP had to take the anti-rabies treatment. W4AEG of West Palm Beach, Fla., is in Montgomery for the summer. W4AKM is off the air. W4AHP and W4AJR are playing music instead of radio. W4AAQ is announcing at WSFA. Let's have more reports, fellows.

Traffic: W4AP 7.

WESTERN FLORIDA — SCM, Edward J. Collins, W4MS — Route Manager W4ACB. W4QR leads this Section this month. W4ACB is announcing prizes for traffic handling, so everyone get busy. W4ACB went on a trip through South Florida. W4QR, W4DP and W4AFT have been with the National Guard at Camp Foster. W4ARV has been on regularly. W4ART is having a trying time with low power. W4UW-W5NO receives his O.R.S. appointment this month. W4ADV, W4AWJ and W4ALJ have been on C.M.T.C. W4AWC is getting his transmitter together. W4QK says that the gang doesn't answer his CQs. W4QU is on regularly with 1000 volts on a '10. W4FV reports winning the International Contest certificate for this Section. W4KB was visited by lightning twice this month. Mrs. W4KB has her operator's license. W4AOO is getting out FB with his 'phone. W4AAX has his 'phone crystal control now. W4AUA is very busy with his Naval Reserve Unit. W4HQ is increasing power. W4AQY has been having trouble with his transmitter. W4VR's plane crashed, but no one injured. W4PN has changed QRAs. W4ATN is having receiver trouble. Mrs. W4MS is now W4AXF. W4AUW is getting out FB. W4ASG was visited by lightning. W4AUV is rather silent. W4SC quiet due to everyone being at camp. W4MX is the proud owner of two new '10s. W4ASV can't get QSLLs out of his QSOs. W4ACB is the proud owner of a VK heard card. W4ARD has been very busy flying. W4MS has a new power supply. W4FV's best traffic was taking a message from Brazil, putting it into New York and giving the Brazilian the answer in 30 minutes. FB.

Traffic: W4QR 113, W4ACB 32, W4FV 34, W4ARD 5, W4MS 24, W4UW 44, W4HQ 8, W4KB 15, W4ART 9, W4ASV 1, W4MX 4.

EASTERN FLORIDA — SCM, E. M. Winter, W4HY — RMs: W4NN, W4AAB, W4SQ, W4CR. Reports from W4AAB and W4AQT-W4ZU were received last month too late for inclusion in regular report. W4ZV is using '10s in push-pull. W4AAB was on the air during June Route Managers Nite. W4TQ and W4AGN went to Key West for the annual Naval Reserve training. Ex-W4ABL is helping out at W4WW. W4MM keeps two schedules. W4AHK keeps schedule twice weekly with W4AGI. W4ABL is on 3533 with 'phone. He reports two new members in the A.A.R.S., W4ACZ and W4ATX. W4QP and W4ZV are on 7 mc. W4KS is a new ham at Vero Beach. W4WS sent me notice of a ham meeting in Deland which was received AFTER the hamfest. From reports reaching me unofficially, understand they had something over 25 ops on hand. W4AQI worked X, YN and W6. W4ZU blew his '12 and put in a '45. W4VP builds the neatest shortwave code receiver it has ever been our pleasure to handle. Had a mighty nice visit from W4AJD of Miami. Welcome to W4QR at Daytona Beach. W4VP built a nice new transmitter for him. W4ASR is rebuilding. W4IP-W4NF of St. Augustine spent part of the month at Camp Foster. W4AGS is Florida National Guard station.

Lieut. Hoffman, W4ASQ, is in charge. Following are members of the National Guard Net: W4ANJ, W4BQ, W4GS, W4SC, W4BU and W4NF. W4GS, W4ASQ, W4SC, W4BU and W4NF spent two weeks in training at Camp Foster. W4AGB (Mrs. W4NN) kept a sked with NY1AA at Balboa, CZ. W4NN is on 3650 kc. W4HC is at the beach for the summer. W4TK operates at WJAX. W4AEM has arranged two schedules. W4AHZ is a new ham in Jacksonville. W4UX is experimenting with an MOPA at the beach. W4HF and W4NC called on the Route Manager, W4NN, at the beach, as did W4TK, W4UJ, W4HC, W4RU, W4FM, W4AIJ, W4AER, W4AKL and W4ACB. W4FM has been spending the past three weeks at a camp over on the Gulf. W4AGN handled U.S.N.R.F. traffic on 3760 kc. W4AAB's year old boss of the house has been teething. The Plant City Radio Club now has five licensed operators. W4ZU worked YN1BX, a station of the Standard Fruit Company in Puerto Cabezas, Nicaragua. W4ZV is getting out FB. W4AIV is on vacation in West Virginia. W4FQ lost his job at Mulberry. W4IK is now at Plant City. W4DZ is a new ham in Tampa. W4IK, W4ZV, W4ZU and two club members visited Lakeland and W4GV, W4ATA and W4JH. W4WW is operating at WRUF. W4AUF visited the Plant City Radio Club. Dr. Kane has been appointed traffic manager of the Miami Radio Club and station W4LA. W4AFL is building a d.c. pentode receiver. W4AON is building a push-pull TPTG. W4JO is moving. W4BF and W4SM are after new licenses. W4FZ is having trouble making a crystal holder that will stay put. W4AGY is building a new AC receiver. W4BT is building an MOPA. W4KK is working on a '10 Hartley rig. W4BJ is back from school. W4NE has a 100 watt MOPA. W4MD has developed a new scheme for a time-delay relay. W4QF is on 3.5 mc. with 'phone. W4CR is on 14 mc. with a '52. Mr. R. H. Sullinger, of Pan American Airways, gave the MARC a lecture on the subject of MOPA's. We understand a branch of the Radio Supervisor's office is to be located at Miami with Mr. J. H. McKinney in charge. Your SCM is using an MOPA on 7 mc. W4DU spent two weeks at Camp Foster as Captain in the Dental Corps. W4UK is still trying to get out with his crystal-controlled 'phone. W4RU is on the air. Will any of you fellows who want ORS and OBS appointments take the time to write me and make application for same? Don't overlook the Official Southeastern Division Convention in Jacksonville, September 18th and 19th. Get in touch with your SCM, W4HY, and make reservation now. W4AGN and W4TQ have returned from training at Key West. W4GD has returned from a trip through the North. Be sure to send in reports regularly every month.

Traffic: W4MM 21, W4AHK 8, W4ZV 20, W4ABL 51, W4QP 4, W4WS 50, W4AGB 2, W4NN 13, W4UX 2, W4FM 2, W4AGN 36, W4LA 21, W4HY 4, W4AGY 6, W4AAB 5, W4WW 5, W4AQT 6, W4ZU 6.

GEORGIA-SOUTH CAROLINA-CUBA-ISLE OF PINES-PORTO RICO-VIRGIN ISLANDS — SCM, J. C. Hagler, Jr., W4SS — This report is being compiled at Headquarters. Our sympathies go to SCM Hagler in the loss of his father. CM8YB has the highest traffic total. W4PM is doing good work in the A.R.R.L. Net for American Legion. W4BO is after ORS. W4IR is putting in 50-watter. W4WB is trying to get crystal rig to perk. W4GB has new transmitter going. CM8UF reports new ham, CM8AZ. W4APW is on 7 mc. W4MJ is a member of the Knights of the Kilocycles. W4DL is using 50-watt MOPA. W4ADN is using portable call, W4PAJ, at Ft. McClellan, Ala. W4MV has been on 3.5-mc. 'phone. W4ZL is new ham in Atlanta. W4ADR reports new ham, W4ADA. W4NT is working DX. W4AJ has receiver trouble. W4AOC has new transmitter and receiver. W4MO has been heard by PA0QQ on 3500 kc. Reports were received from the following: W4ST, W4AAZ, W4KJ, W4JD, W4BW, W4QZ, W4MA, W4PD, W4AAS, W4WZ, W4KX, W4MN. W4KY is OBS. W4AUT is changing from 'phone to CW. W4ASZ is moving to new quarters. W4QE has joined the ranks of the benedicts. W4VO and W4APK are organizing an Army-Amateur Radiophone Net for Georgia. W4PE has been elected President of the Atlanta Radio Club. W4AEV received cards from HAF3C and F8DFM. W4AOC had his portable W4PAQ at Boy Scout Camp at Orchard Pond. W4SO has schedule with W4WB. W4CE has moved to Dillon, S. C. W4AFQ is doing good work on 'phone. W4ZW, Junior op, is now Radio Engineer, Rome Broadcasting Corp. W4AHT has been at CMTC. W4JL will be on crystal control soon. W4DX is Chief of Radio Section, Reg. H. Q. Co., 118th Inf., S.C.N.G. W4KV is working at the Atlanta airport. K4RJ sends some dope from Porto Rico: Mr. Twight, K4JA, will soon be on with 75-watt MOPA. K4AOP is making effort to get his gear into shape. K4UG has little time for operating. K4JE is tuning up a 75-watter. W4RJ is active on the air, mostly on 14 mc. CM2JM has been elected President of the Cuban Amateur Broadcasters in the Radio Club of Cuba. The club's call is CM2RC. W4GT is having "the time of his life" in California. W4ACQ sends in his first report. He and W4LR expect to go in for ORS. W4DV and W4AAY are vacationing as this report is written.

Traffic: CM8YB 135, W4PM 60, W4BO 30, W4IR 23, W4WB 12, W4GB 11, CM8UF 7, W4APW 6, W4MJ 6, W4DL 5, W4ADR 5, W4NT 4, W4AJ 2, W4MO 1, W4AOC 1, W4JD 1, W4JL 2.

WEST GULF DIVISION

OKLAHOMA — SCM, Wm. J. Gentry, W5GF — W5VQ is the high traffic station again. W5BPM is planning a crystal rig. W5BPF is going to California. W5ALD is putting his parts into a 14-mc. 'phone. W5KZ is still off due to summer weather. W5RB is a new ham in Tulsa. W5AFB is about well now. W5ABO has rebuilt his rig. W5QL says 14 mc. not much good for DX now. W5APY is trying to get his receiver to work. W5BRD is moving. W5AYF is still on Sundays. W5ASQ is on the air part of the time. W5AFX has his high-power crystal rig perking. W5AMC has cancelled some schedules. W5GF still has his '10s. Well, gang, all are requested to attend the convention in Okla. City, Sept. 11th and 12th. A fine time is assured.

Traffic: W5VQ 851, W5OJ 101, W5BMU 35, W5BOE 32, W5ALF 19, W5ALD 19, W5GF 4, W5APY 2.

NEW MEXICO — SCM, Leavenworth Wheeler, Jr., W5AHI — W5AUW is back on with several good schedules. W5AUW and W5AJR worked England. W5AIE QSOed South Africa. W5ND is on occasionally. WB5QE rebuilt his set "pretty." W5KT is working in the Lovington oil fields. W5TV is enjoying sea life on the U.S.N.R. cruise aboard the U.S.S. *Buchanan*. W5AHI was delighted to have as callers W5AIE, W5AUW, W5BQE, W5BRV, and Arizona's RM, W6HS. W5JZ writes that the only news of the gang he gets is contained in these reports. W5BPJ reports.

Traffic: W5AHI 349, W5AUW 234, W5BPJ 20.

NORTHERN TEXAS — SCM, Roy Lee Taylor, W5RJ — W5AUL reports W5BTB moving to Florida. W5NV-W5YG is pounding brass at W5AUL's. W5BII wants South and West Texas schedules. W5RJ is leaving on vacation. W5HY reports summer school. W5BAM is rebuilding. "W5ZC" reports for the first time. W5LY's MOPA is still OK. W5WW won Sweepstakes and DX contests for our Section. Very FB, Adams. The Wichita Falls Club got their report in way ahead of time. W5ANU reports for the Jacksonville gang. W5AVF has a new receiver. W5BRC's 'phone is hot at W5EQS. W5ANU is using new TGTP. W5BAD is back in Ennis. W5AZP expects a high-power 'phone this fall. W5BND is on occasionally. W5AIJ fools with 14-mc. CW some. W5GZ has a high-power 'phone now. W5BYO and W5AAM of Ft. Worth are installing 50-watters.

Traffic: W5AUL 56, W5BII 52, W5RJ 35, W5HY 31, W5BAM 23, "W5ZC" 19, W5LY 8, W5WW 4, W5AYX 18, W5BJX 9, W5AVA 9.

SOUTHERN TEXAS — SCM, H. C. Sherrod, Jr., W5ZG — Where is this depression? Every month we are getting more and more reports. Drop your SCM a line between the 15th and the 19th of the month. The address is 1906 Wheeler St., Houston, Texas. Austin: Barclay is leaving on a trip through north Texas and Oklahoma, and will be using the call W5BRK. W5PU will be working W5CT in Barclay's absence. W5APW is doing nicely on 'phone. W5KA is winding chokes. W5AON is a new ham. W5CT handled an emergency order for tappets for a racing car. Houston: W5BHO is working a 3500-kc. MOPA 'phone. W5LB has received his 14-mc. 'phone ticket. W5ASM is

rebuilding completely. W5BOC has changed his call to W5QG. W5AVU is getting out nicely. W5ON is on 3500-kc. 'phone. W5AMX is a new 'phone in Houston. W5APQ has moved to Austin. W5BML is heard now and then. W5AZR has a really nice shack. W5EI is on occasionally. Baytown: W5DS has a brand-new 250-watt MOPA. Dasietta: W5BLD is on there. Rosenberg: W5PU is attending the summer session of State University, so no activity. He may be reached through W5CT. Bay City: W5KM passed his first-class ham exam recently. Ellis plans to be on the air shortly. Mallard also passed the amateur exam. Corpus Christi: As usual those two fellows Parks and Nelson give me enough dope to write a book about. Mr. T. J. M. Daly, an old-timer, donated the Corpus Christi Radio Club a complete 250-watt transmitter. W5AB participated in the recent boat race from Galveston to Corpus and worked with the U.S.S. *Saranac*, NRUK. W5MX is kicking two '52s with one pentode. W5JJ is just out of the hospital. W5AQK and W5BKG are on consistently. W5TO is threatening to come back, but his pal W5AAA says N. D. W5ALV works Morse all day and continental all night. W5CL is grinding crystals. W5ZX has a new pentode rig. Port Arthur: W5BKU is a newcomer in the ranks of the reporters. W5BKF is using a '10. S5BBA and W5AWK are new hams. W5YH is on regularly. W5BOX is awaiting license renewal. W5AZS is on regularly with a fast bug. W5BCF is coming on. San Benito: W5AEV reports by radio. Kerrville: W5BKE has been heard back on. Ft. D. A. Russell: W5BSV applies for O.R.S. W5BSV is using 100 watts push-pull. San Antonio: W5AYR reports as usual. W5AYR is keeping schedules. The San Antonio Radio Club is in full swing with Becklemann, W5AZD, as president. The club meets every second Friday in the month at the local Y.M.C.A. The appointment of W5AHB as O.B.S. has been cancelled. The new O.B.S. for San Antonio and vicinity is W5AUC. W5ADC has returned from his vacation. Ex5GJ will be on shortly. Harry Wells, of PMZ fame, is in the advanced class at Brooks and sits in at W5AUC now and then.

Traffic: W5AUC 704, W5AEV 37, W5BSV 203, W5MS 11, W5CT 22.

CANADA

MARITIME DIVISION

NOVA SCOTIA — SCM, A. M. Crowell, VE1DQ — EXTRA-SPECIAL ANNOUNCEMENT TO ANY VE1's WHO WERE UNABLE TO ATTEND THE CONVENTION — C.H.N.S., through Station Director Borrett, has offered a large and beautiful silver cup to be presented to the amateur in this Division who, during this present year, (Jan. 1st-Dec. 31st, inel.) works the greatest number of stations. This is not a DX contest and any or all amateur frequencies may be used. QSL cards are to be submitted to the SCM at the close of the contest for judging. The station furnishing cards showing the greatest number of QSOs (with different stations of course), takes home the cup. Get busy, boys. VE1AK, VE1CL, VE1AG, VE1CA and VE1BN have been on 3.5-mc. 'phone. On 7 mc. C. W. VE1BL and VE1BV have been going after DX. On the 14-mc. band VE1BR, VE1DR and VE1CO have been doing things. VE1DQ reports working another "G" and a "TI" this month on his 14-mc. crystal controlled 'phone.

ONTARIO DIVISION

ONTARIO — SCM, C. D. Lloyd, VE3CB — VE3ET sends in a flock of reports for the boys in the North Country from the Air Camp station at Sioux Lookout. VE3DY has been having a lot of fun trying to make a '24 oscillate at ultra high frequencies. VE3BZ is planning much activity. VE3DD is making the odd contact on 3500 kc. VE3UR reports little ham activity. VE3CJ has worked both coasts on 3500 kc. VE3AT is getting out OK. VE3AK is QRL. VE3EK is working with low power. VE3IF is building a new transmitter. VE3BD is getting out well. VE3GX is planning a snappy layout for fall. VE3DI has secured his commercial ticket. VE3HN has been busy with exams. VE3GK has been doing good work. VE3CE has had his call changed to VE3PN. VE3AU is keeping a number of schedules. He and VE3CA are organizing a Trans-Canada Traffic hookup. VE3LM and VE3TM are planning for greater activity after holidays. VE3AD is only able to work during week-ends. VE3DA is working in the 3500-kc. band. VE3DB is improving his golf. VE3DW says it feels good to be at the key again. VE3QB reports conditions good. VE3GL has put up a new Zepp. VE3CA is looking for a schedule with or near Toronto. VE3HA is reaping the benefit of Easter holidays in the form of foreign DX cards. VE3BM has secured his WAC certificate, and his certificate as winner for Ontario in the International Tests. VE3CD has dropped all schedules temporarily. VE3GT comes across with a trophy in the form of a 3.5 mc. crystal to the Ontario station handling the most traffic from Sept. 1st to the end of the year. Thanks very, OM. VE3IR, VE3TT, and VE3CP send in first reports. VE3CB is on the air daily.

Traffic: VE3HN 2, VE3GK 33, VE3AU 31, VE3HA 1, VE3CD 22, VE3IR 8, VE3CP 13.

QUEBEC DIVISION

QUEBEC — SCM, Alphy L. Blais, VE2AC — VE2CA handled two Prince of Wales birthday messages. G2QO and Pierson, who was with Godley at Androssen, Scotland, in 1921 when the first American signals were heard across the Ocean, were visitors at VE2CA. Mr. and Mrs. VE2CA and VE2CL were guests of the visitors on board the ship. VE2BB keeps young pounding away on the key. VE2CO has a schedule with VE2CX, who has a portable with him in Metis Beach. VE2CU works plenty DX. VE2AY is installing new equipment. Several letters have been received favoring a convention some time next fall in Montreal. VE2BE is busy as ever. VE2AB is out north salmon fishing. VE2AC is busy with research work in biology. His 28-mc. transmitter is completed and will be on the air regularly next month.

Traffic: VE2CU 5, VE2BB 10, VE2CA 12, VE2AC 17.

VANALTA DIVISION

BRITISH COLUMBIA — SCM, J. K. Cavalsky, VE5AL — VE5AM and VE5BI are very pleased with the results they are having on 56 mc. VE5BC has taken up golf. VE5DD has started experimenting on 'phone. VE5HG has put in a pentode. VE5AL is constructing new apparatus. VE5AC has replaced his fifties with five watters. We believe VE5EH and VE5EW have worked most all the W6's now. VE5CF is still busy. VE5GF is held up for lack of equipment. VE5FI has been on the sick list. W7BG, the Northwest Division Director was a guest at VE9AJ and gave the club a talk on the doings at Headquarters. W6OI and W6WX also visited the gang during the month. The Victoria gang held two picnics during the month which were voted great successes. VE5CO and VE5EC haven't been on much. VE5DV is hitting out on the DX. VE5DQ and VE5HR are out for rebuilding. Owing to frequent visits to the dentist, VE5CB says his face is too sore to have the cans on. VE5CH is the only one from the Island to turn in a traffic total. VE5HP sent in his report. VE5GT hopes to make himself heard shortly. VE5DY finds home-made transformers make fine electric stoves. VE5DI is still silent. VE5AD is still trying for his commercial "first." W7QM was in Victoria lately, and gave away prizes at the picnic. W6WX-BPW from Berkeley, Calif., also visited Victoria.

Traffic: VE5CH 22, VE5AL 12, VE5AC 7, VE5AM 2, VE5BC 4, VE5HP 3.

PRAIRIE DIVISION

MANITOBA — SCM, J. L. Green, VE4BQ — Greetings, gang, here's my initial report. The Manitoba Wireless Exp. Assn. are now arranging the coming season's program, which opens Sept. 17th. VE4DJ worked three VK's, three K6's, also a ship, VZX4X. We are glad to welcome a new station, VE4RV. VE4IU is putting out a fine signal on 7 mc. VE4AE is heard regularly on 14 mc. A 50 watt 'phone station is now under construction at VE4GQ's shack. We understand VE4AR is planning 3.5 mc. VE4AG is QRL. VE4IS is a prospective ORS. VE4DK and 4IC are down east for the summer. VE4BQ has worked all continents again.

Traffic: VE4DJ 9, VE4AY 9, VE4GQ 4, VE4BQ 3.

• CALLS HEARD •

G2HJ, K. E. B. Jay, The Quinta, Elm Close, Amersham, Bucks, England

14,000-kc. band

w1aca w1acm w1ae w1aeh w1akn w1akv w1akz w1ane w1aol w1asc w1atd w1au w1avj w1avu w1axa w1axx w1aze w1bdf w1bdl w1biu w1bjd w1bsk w1bvl w1bxc w1cab w1cej w1cd w1chr w1cmx w1crp w1csm w1ctc w1fh w1ha w1lk w1lq w1mi w1mh w1na w1ph w1qb w1wu w1uh w1zi w1zs w1zy w2aar w2ace w2adi w2adp w2aey w2afm w2agf w2agx w2ai w2akd w2alk w2amr w2ano w2aoe w2aox w2apy w2asc w2asy w2axb w2azo w2bak w2bhs w2biv w2bkg w2bkt w2bqt w2bro w2bsf w2btv w2bux w2bxt w2bzb w2cbu w2cda w2cgv w2cjx w2ckr w2cls w2cmu w2cpa w2csy w2ctw w2cvj w2cyx w2czf w2fd w2ff w2fl w2gx w2hq w2jd w2jf w2jn w2qa w2rq w2rs w2tp w2vd w2we w3aaz w3aiz w3apo w3bfa w3bph w3cee w3di w3dp w3dy w3fq w3jm w3ke w3ny w3py w3uy w3zf w3zg w4ada w4agd w4akh w4auu w4bs w4mj w4mk w4lo w4ur w5bee w8adg w8afe w8ann w8aon w8aoo w8bck w8bf w8bgt w8blh w8bwj w8cpc w8cte w8dbg w8dme w8ekj w8nb w8nd w8za w9adn w9brx w9eap w9elk w9pk velab velap velbr velbv veldr ve2bb ve2bd ve2bo ve2ea ve2cx ve3cs ve9aj vlyb cm1by cm1fm cm2sh cm8uf cn8mi cx1af x5x oa4z py2qa rv1k su1aq tf3tp eux2di b7x kbj k4bpf k4kd k4rj

John M. Turner, 145 Englewood Ave., Boston, Mass.

(Heard between February and July 1st)

14,000-kc. 'phone stations

g2nm w1ace w1bon w1rq w1uh w1axa w1ccv w3zx w3bph ve3mb w4agr w4mj w4ly ve4ar w5ql w5bee w5acl w5aav w5abo w5aem w6aj w6vq w6ezk w6ahq w6ahp w7akm w7nm w8wu w8dsw w8dld w8pe w9ld w9dll w9bsr w9bes w9def w9duy w9anz w9le w9bre w9bko w9qe w9bhm w9auh w9ahq w9drd w9bid w9pv w9ark w9aaq w9eqp w9ame w9eel w9btp w9fbi w9elq w9enu

1750-kc. 'phone stations

w1aky w1ayv w2fk w3rp w3ae w4lc w4uu w4ain w8caw w8cpl w8rd w8efv w9bsp w9app w9ege w9ma w9dax w9gyk

W1TW, W1BUX, Doug Borden, 77 Tenth St., Providence, R. I.

(Heard between May and July 15th)

14,000-kc. band

ce1au ce1ax ce2ab ce3eh cm1by cm1fm cm2jt cm2kw cm2pa cm2ra cm2sh cm2sv cm2wa cm2wd cm8uf cr9en ct1aa ct1cn ct2af ct2an ct2aw cx1aa cx1bu cx2bt d4aap d4jpe d4uak ear94 ear121 ear128 ear185 ei2b ei7c f3mta f3smi f8anc f8bs f8btr f8eo f8er f8ex f8fw f8hr f8ok f8ol f8px f8pz f8rs f8sf f8sz f8tex f8tp f8tq f8tv f8ug f8ul f8vj f8vp f8xz g2ao g2az g2bl g2by g2cj g2dh g2dx g2fn g2gf g2gy g2ig g2kl g2ma g2nh g2pa g2op g2qv g2qy g2vq g2vv g2wv g2yd g2zp g2zx g5bj g5by g5bz g5dd g5fc g5is g5kl g5la g5mb g5ml g5mu g5ni g5nj g5og g5pl g5qa g5qy g5sr g5sy g5vl g5vm g5yk g6bb g6bs g6dh g6ge g6gd g6gx g6gz g6jg g6lf g6lk g6nf g6om g6ot g6ow g6pm g6rb g6re g6rg g6rw g6vp g6wk g6wn g6wy g6xj g6xn g6xq g6yg g6yk g6yl gi5nj haf1g haf2c haf2g haf3wr haf8b he1en he1fg he2jm i1daa i2aa k4kd k4rj k6vg la1g la2z lu1ba lu2ca lu2ej lu3da lu3de lu3dh lu3fa lu4da lu4kc lu5dee ny1aa oa4j oa4z oh1nf oh2pp oh5ng oh7nb ok1na ok2ok ok2rm on4bz on4dj on4fe on4fm on4fp on4fq on4gn on4hp on4jc on4jf on4or on4uu oz5a oz7vp pa0fb pa0fp pa0flx pa0jl pa0ln pa0ps pa0qf pa0wr py1aa py1ca py1cd py1cm py1fb py1xo py2ba py2bm py2bn py2bq py2bt py3ad py3aj py8ia py9an rx1aa rx1paa sm5rg sm6ua sp1ae sp1kz sp3lz ti2ags ti2bf ti2fg ti2tao uo1cm uo3wb uown vlja vlyb vk3wl vo8me vo8z vp2pa vs6ah x1aa yl2ba yt1gz zl3as fx nams pxr wdde

W6WO, W7AOU, W6CBS, Leonard T. Robinson. 1545 West 8th St., Los Angeles, Calif.

7- and 14-mc. bands

ac2aa ac8dm ae3eo cm2rz cm8ol cn8ma k6dmm k6exy k6ewa k6ewz k7abs k7ars k4kd ka1sr ka1cm lu9da lu1ab py1id py2bj ve1ab ve1ac ve1bg ve1eb ve1ei ve2ag ve2au ve2bb ve2bw ve2em ve2eo ve3au ve3by ve3cd ve3ei ve3dd ve3ut ve4ea ve4cg ve4ih ve4fp ve4jc ve4rp ve5cf ve5ee ve5gt vk2ac vk2hc vk3ab vk4kh vk4wb vk5hg vk5wa vs6ae vs7al x9a x29a x3a zl1ab zl2aa zl2ac zl3bb vfi wvkh yla vja w1mk w1rp w1si w1uc w1wi w1wv w2abr w2adl w2agx w2awb w2bal w2cbw w2cxl w2cyx w2wb w3aag w3ant w3cdl w3cdq w3om w3wo w4afk w4ahy w4ald w4ln w4gw w4pai w4tn w5ahi w5ajr w5aej w5aoe w5avz w5aot w5bic w5bnr w5hb w5gp w5jc w5uw w7abx w7ac w7aax w7aec w7afx w7aoq w7amv w7azb w7fv w7ib w7jq w7ar w7ue w8abr w8aez w8alu w8bvx w8ctj w8csw w8ddg w8dkt w8duk w8kl w8rd w8vm w9ak w9aye w9aod w9aab w9bl w9bir w9bdt w9bmt w9bgo w9bjr w9bpb w9bvh w9chx w9ces w9cbw w9cuj w9cgm w9clq w9doc w9dtb w9dfi w9eqe w9fkc w9fum w9fww w9gdm w9gky w9fa w9lk w9qx w9um w9wb

J. K. Tutton, 31 Denham St., Hawthorn, E2, Victoria, Australia

7000-kc. band

ac1bx ac1lf ac2cb ac3al ac3gb ac3ma ac8ad ac8go ac8hm ac8na ac8tj ac8we ac8yt ar8fdy au1cc au1kae au1nz au1rd au1rg au7bg au7br ce1aa ce1ah ce3bm cn8eis cne ct1aa ct1bg ct1bj ct1bo ct1bx ct1by ct1oe ct1ow ct1db ct2aa ct2ac ct2ae ct2af ct2ag d4adb d4ggb d4jj d4nsn d4rng d4uan ear10 ear20 ear21 ear52 ear74 ear94 ear96 ear98 ear104 ear116 ear121 ear125 ear128 ear170 ear174 ear185 earz earco earpez eu2km eu6ac eux5fi f3oeb f8aap f8am f8ax f8bbb f8cm f8cs f8dt f8ef f8ej f8eq f8fo f8gj f8hp f8iv f8jd f8ji f8kwt f8lgb f8pa f8pm f8pr f8py f8pz f8sm f8whg f8wrg f8wok f8xaz fm8eor fm8lc fnih frear149 frear153 g2dn g2lz g2rv g5nq g5by g5bz g5ml g5pj g6rg g6wy hb9h hb9q he1fg hk1aa hx2po i1ev i1hv i1mm i1rt j1dm j1dq j1dr j1dv jqdw j1ee j1ek j1ep j2wv j3eq j3cr j3cs j4ce j5ce ka1ce ka1cm ka1dj ka1el ka1hr ka1jm ka1jr ka1la ka1nf ka1pw ka1re ka1rt ka1sl ka1sp ka1su ka1sw ka1xa ka1za ka1zc ka4hw ka7lg ka8aa ka9pb kawyr kfr6 k6agi k6aja k6axk k6baz k6bjj k6boe k6ccs k6cib k6cmc k6cog k6crw k6cxy k6dju k6dmm k6dud k6dv k6dyc k6ed k6ene k6eqm k6etf k6ewz k6fcx k6fez k7atd nn7xj oa4q oh1nj ok1aa ok2cc ok2va om1tb om2rc on4aa on4el on4fe on4gw on4ia on4jb on4lr pa0xf pk1cf pk1cr pk1vh pk3bq rx1ao sp3ar st2d ti3xa ts4sr ts4sup velco ve2ca ve4dj ve5dd vo8me vp1aa vp1ws vp6sr vq1aj va1ab va2af va3ac va6ae va6ag va6ah va6al vs7ap vt2bn vu2jb vu2kh w1abl w1abn w1af w1agi w1ajx w1akz w1anc w1apz w1asf w1avj w1avl w1axv w1ayc w1azd w1bjd w1bke w1bkf w1blo w1blv w1bty w1bxc w1cbz w1ccp w1ccx w1ccz w1cek w1cg w1cjg w1cpf w1cpi w1crw w1ea w1fm w1km w1lz w1me w1mk w1mx w1oh w1on w1pz w1rq w1sz w1zj w2afb w2aif w2alu w2amr w2ans w2atz w2aup w2av w2awv w2axn w2ayj w2az w2bda w2bds w2bgk w2bhn w2bkg w2bod w2boz w2bqg w2bsk w2bsr w2bvg w2bzn w2bzs w2cbp w2cbw w2ced w2cd

w2ecx w2ego w2eht w2ejj w2ekw w2epe w2etc w2etw w2fn w2gx w2ho w2ih w2ir w2jd w2ku w2mk w2oa w2ov w2pn w2re w2rx w2sn w2vy w2za w2zc w3aad w3abo w3adx w3aft w3agf w3aha w3ajd w3ajh w3amp w3ant w3aou w3apn w3aqi w3asg w3avj w3ax w3bbb w3bcf w3bel w3bes w3bfa w3bfh w3bm w3bwt w3cic w3cxl w3fq w3hg w3hy w3kw w3ly w3md w3my w3ny w3wd w4aa w4ab w4abc w4abs w4abw w4acv w4adt w4aem w4afk w4aft w4agk w4agw w4aig w4ajs w4akg w4akw w4alm w4anf w4ao w4by w4cg w4ec w4eg w4ei w4ft w4fv w4gw w4jh w4kh w4ly w4mk w4mm w4nn w4oc w4pf w4qf w4rx w4tj w4tk w4tp w4ty w4zh w5abk w5ach w5acl w5aff w5afx w5agq w5ait w5ald w5alm w5alp w5amc w5amn w5aq w5aqy w5ast w5asx w5axx w5ayf w5ayl w5aza w5bah w5bam w5bbq w5bcb w5bcx w5bfp w5bfw w5bkn w5bld w5bmp w5bna w5bno w5bnz w5bol w5bqm w5bqu w5bri w5brv w5btr w5ca w5ce w5de w5ds w5eb w5ei w5ev w5fc w5gz w5hb w5jc w5jv w5kl w5kx w5lb w5ms w5mx w5oc w5ow w5qa w5ql w5rg w5rj w5rr w5td w5uo w5vm w5yg w6abk w6acp w6acv w6ad w6adl w6aep w6afg w6afh w6agr w6ahk w6ahp w6ahu w6ahz w6aic w6aij w6aiu w6aix w6ajd w6ajl w6akb w6ako w6akf w6aku w6akw w6akx w6all w6aln w6alu w6alx w6alz w6am w6ame w6amm w6ama w6amz w6ann w6any w6aog w6aor w6aqg w6aqj w6ase w6atj w6aup w6awa w6awd w6awg w6awp w6awy w6ax w6axm w6aye w6azh w6azu w6bac w6baz w6baj w6bbo w6bbo w6bed w6bck w6ben w6bco w6bfa w6bhm w6bht w6bip w6bjc w6bjf w6bjp w6bkl w6bmj w6bpc w6bpo w6bpv w6bpw w6bqk w6bql w6bqs w6bsn w6bss w6buo w6bvb w6bve w6bvg w6bws w6by w6byb w6byy w6byz w6bzd w6car w6cce w6cek w6cel w6cfe w6cfk w6cgp w6cgx w6che w6chy w6cig w6cii w6cix w6cje w6clo w6cma w6cmi w6cnc w6cpe w6cpg w6cqi w6cqk w6cqs w6cqz w6cri w6cro w6csj w6ctx w6cug w6cuh w6cul w6cvf w6cvz w6cwh w6cxw w6cyr w6czk w6czu w6dev w6dep w6dip w6diq w6dgq w6dgu w6dhp w6djp w6dkc w6dkw w6dmp w6dob w6doi w6dpf w6dpj w6dpk w6dqv w6drh w6drl w6dsc w6dtd w6dtt w6dui w6duj w6dwa w6dwi w6dwp w6dww w6dxl w6dxt w6dyf w6dyj w6dza w6dzo w6dzq w6dzu w6dzz w6eak w6eaw w6ebg w6ebt w6een w6ect w6ecv w6edj w6eep w6efq w6efr w6efv w6egh w6ehi w6eif w6eim w6ein w6ej w6ejc w6eji w6eke w6ekf w6ekn w6ely w6emk w6enx w6eqb w6eqc w6eqj w6equ w6erk w6erm w6es w6esa w6eug w6evf w6evn w6ew w6exq w6eye w6eyj w6ezb w6eze w6ezg w6fai w6faq w6fas w6fbh w6fca w6fek w6ffa w6ffe w6ffp w6fh w6fqr w6gf w6hk w6hm w6hy w6id w6jm w6jy w6kt w6lb w6lx w6og w6ov w6pb w6pe w6pn w6pw w6qp w6sa w6sc w6sf w6sn w6sq w6uc w6uh w6wg w6wn w6yu w6yx w6zv w7aag w7aax w7aba w7ac w7adr w7afe w7akq w7alm w7alv w7aof w7apr w7aqi w7at w7bb w7bd w7bdk w7df w7dl w7fv w7gj w7he w7hm w7hp w7ij w7iq w7kk w7lk w7lp w7mo w7mx w7pp w7px w7qf w7qi w7rt w7ts w7wl w7wq w8aav w8ac w8adg w8aj w8ajt w8ajz w8aka w8akn w8alo w8ano w8aqm w8asg w8axa w8auu w8bau w8baz w8bbl w8bcf w8bck w8bct w8bf w8bg w8bgt w8bjo w8bjx w8bkp w8bky w8bma w8bny w8br w8bv w8cb w8ccw w8cf w8cfe w8cfp w8cft w8cga w8cks w8cle w8cqp w8css w8csw w8cx w8dcz w8ddk w8ded w8dfe w8dgg w8dgp w8djv w8dpo w8dub w8dwm w8dz w8gz w8jk w8lt w8nv w8pl w8qx w8rv w8rw w8sg w8sh w8sk w8sy w8vo w8wo w9aa w9adn w9ahq w9aic w9ain w9aio w9aja w9ank w9aqj w9arf w9arn w9auj w9aus w9bca w9bez w9bfl w9bgl w9bir w9bly w9bma w9bmd w9bnh w9bqw w9bvh w9bwt w9bxj w9cbj w9cd w9da w9cej w9ces w9cgc w9ckf w9ckq w9cks w9enl w9eos w9etw w9evd w9eve w9ewx w9cxf w9dee w9ddb w9ddy w9dfr w9dft w9dgz w9dik w9dku w9dng w9dnp w9doc w9doe w9drq w9dtb w9dti w9dwa w9eap w9eci w9ecs w9ecz w9ef w9efk w9egu w9eme w9eru w9erv w9erz w9eta w9etc w9eul w9eve w9eyc w9ez w9faw w9fkc w9flh w9fmx w9fqh w9fqy w9frq w9fur w9ga w9gbj w9gdm w9ghk w9gjt w9gkt w9gme w9gv w9io w9jl w9ka w9kd w9ld w9lf w9mi w9ob w9qf w9qj w9qx w9tl w9um w9uw w9ve w9za z9a yi6gb 1kor eem ike kn2 lcfh lcuo lex sfen vjlq1 xaulzb xau7kal xf7c xoh5an xnu7efg xx3bmd

14,000-kc. band

cs3cr ct9aa d4wao ear21 ear39 f8aly f8axq f8ej f8ex f8kwt f8pq f8ps f8rj f8sm f8tv fm8asm g2lz g2od g2vq g5bj g5by g5ba g5la g5ml g5sy g5vm g6rb g6rg g6vp g6wy haf4d haf8b he1fg he2jm j1dr j1dm j1ec j1ee ka1em k6dmm k6erh oa4j oa4v oa4y oa4z oh3na oh7nb oh7nd ok2op ok2rm ok2si ok2va on4au on4fm on4uu oz7hs pa0dw pk3bq pk4aj pk4hh rx1aa st2c st2d su1aq su8rs vs2af vs6ae bs6ag vs7ai vs7aj vs7al vs7ap vs7gj vu2ah vu2bg vzx4x w1aaf w1au w1bby w1bhm w1enx w1kx w1ua w1zi w1zz w2aci w2ais w2aoe w2bdh w2bi w2bpd w2buy w2cfq w2cjx w2eqx w2fd w2hq w2jn w2rr w2vo w2zc w2zg w3apj w3aqo w3bce w3bfd w3bfh w3bph w3ny w4adg w4alx w4bc w4dc w4ft w4lt w4ly w5aav w5acl w5aot w5azq w5qu w6afs w6ahs w6aj w6bax w6bsn w6cuh w6cyr w6dev w6dgg w6een w6egh w6eqb w6ew w6id w6jp w6qw w6tj w6vz w6zq w7aul w7ek w7lk w7mx w7qy w8adm w8adr w8bdz w8blv w8cfn w8chq w8cpe w8cra w8cut w8dgp w8djv w8dv w8za w9adn w9brx w9bwt w9def w9ell w9ghh w9gv w9pv w9qx x1aa x9a xu2uu xu5wa yi6ht zs6y

William W. Simpson, 248 N. Bates St., Birmingham, Mich.

(Heard during March and April)

7- and 14-mc. bands

w6acj w6acv w6adm w6aco w6agr w6ahp w6ahz w6aix w6aka w6akf w6aln w6alt w6alu w6am w6ama w6amc w6amh w6amm w6and w6ann w6anq w6aog w6aqz w6arj w6ark w6asd w6asl w6atw w6auk w6axv w6azl w6azn w6azu w6bam w6bax w6bbo w6bbp w6bed w6bck w6bee w6bfq w6bht w6bhx w6bif w6bih w6bik w6bip w6bjf w6bkz w6blx w6bmk w6bmw w6bpw w6bqd w6bql w6bqy w6brv w6bss w6bsv w6btk w6bto w6bvc w6bvd w6bvg w6bvm w6bvx w6by w6bxl w6byb w6caf w6cbp w6cda w6ec3 w6cfk w6cgp w6cgx w6chf w6cht w6chy w6cin w6cje w6cky w6cpb w6cpj w6cqb w6cqs w6cri w6csj w6ctp w6cuh w6cvn w6cxw w6cyb w6cyr w6cze w6dbb w6dbt w6dcv w6de w6dev w6dfb w6dff w6dgn w6dgq w6dgu w6dgv w6dhp w6djp w6dkc w6dku w6dkw w6dli w6dlk w6dmj w6dnd w6doz w6dpa w6dpj w6dpk w6dpv w6dqi w6dse w6dsp w6dsz w6dtj w6dtk w6dtw w6dtz w6duf w6dwj w6dww w6dxn w6dyl w6dyz w6dzd w6dzu w6dzy w6dzz w6ea w6eah w6ebj w6ebo w6ecc w6ecn w6eep w6efm w6efn w6efr w6efs w6egh w6egm w6ehe w6ehh w6ehi w6eie w6eif w6ein w6eje w6eju w6ekj w6ele w6eme w6emk w6ens w6enx w6eoh w6eop w6eot w6eou w6epq w6eps w6eqb w6erc w6ers w6eul w6eup w6evd w6ewk w6ewn w6eww w6exg w6exl w6exq w6eza w6ezf w6ezk w6ezn w6ezq w6faq w6fas w6fbi w6fde w6feb w6ft w6gf w6hz w6id w6ih w6ip w6iu w6jn w6jp w6ju w6kb w6li w6of w6oz w6pe w6qc w6qw w6sa w6sc w6sf w6sn w6ta w6te w6tj w6tm w6ud w6uh w6uz w6vh w6vq w6wb w6xk w6yu w6zs w6zv w7acd w7acy w7adn w7aec w7afe w7afp w7aij w7ajj w7ajn w7alm w7ank w7aoo w7apv w7aqg w7aqi w7arf w7arq w7ath w7aty w7aul w7awb w7awl w7awz w7bb w7br w7vy w7ew w7fb w7fj w7fv w7gm w7hd w7hx w7in w7jb w7ka w7kk w7mo w7mx w7pl w7qd w7qi w7tx w7ty w7vn w7vt w7wf w7yc w7yl w7zd w7zzg ac2xx ce1ah cm1by cm1fm cm1mn cm2ef cm2fn cm2jm cm2rz cm2sh cm2wd cm2ax cm5cx cm5fl cm5ni cm8uf cm8yb cn8mi cn8mop ct1aa ct1eb ear10 ear21 ear96 ear110 ear136 ear149 ear185 f8fo f8gi f8joz f8jt f8pq f8px f8pz f8rj f8sm f8sz f8tv g2nh g2vq g2zp g5by g5bj g5ml g5vm g5yg g5yk g6qb g6rb he1fg k4aan k4bpf k4kd lu2ea lu3fa lu4da lu4dq nj2pa on4fm on4gn on4hv on4jb on4jj on4wk pa0dw pa0fb pa0gg pa0nb py1ca py1cm py1cr py2bf py2bk py2bn py2bo py2bq rx1aa rx1ao rx1paa ti2fg ti3xa ve1aa ve1ab ve1an ve1ar ve1as ve1bd ve1bl ve1br ve1ce ve1co ve1da ve1dm ve1dr ve1nn ve2ac ve2aw ve2bf ve3au ve3dw ve3fj ve3jc ve4ae ve4ag ve4ai ve4at ve4bb ve4bq ve4bu ve4cn ve4cv ve4di ve4dj ve4dk ve4du ve4el ve4ew ve4fp ve4gf ve4gp ve4gq ve4gu ve4gy ve4hc ve4hu ve4ic ve4iq ve4iu ve4js ve4ti ve5al ve5am ve5bh ve5cr ve5ha vk3hl vk3xx vo8aw vo8j vo8mc vo8z vq3msr vzx4x x1aa x1d x1n x9a zs4m kfu2 ry12 xbaa xo2oz xw1b

11ER, Ing. Santangeli Mario, Via S. Eufemia No. 19, Milano, Italy

(Heard between March 8th and May 3rd)

14,000-kc. band

w1ala w1akv w1ay w1bks w1dw w1gf w1lz w1tw w1ug w1zy w2acb w2ary w2aze w2bhw w2bhz w2bkt w2bsr

w2bvc w2bwd w2ccj w2cdf w2lw w2qf w3bbo w6qt w6qw w8axn cm1by ct1ew lu3de oh1nf op 2op vel de

(Heard between March and May 10th)

7000-kc. band

w1and w1ae w1aed w1aep w1afb w1afg w1ajc w1alq w1aqp w1arf w1aul w1avl w1axs w1bea w1bga w1bix w1bmr w1bnp w1bsz w1btb w1car w1cek w1cel w1eft w1cke w1clj w1cpf w1cpt w1ctn w1dw w1dy w1ej w1fm w1ft w1gf w1hb w1hg w1ke w1km w1me w1mx w1ph w1pj w1sz w1ut w1uw w1vi w1vs w2abe w2ad w2adw w2aep w2afm w2ahq w2ahz w2akm w2aks w2aif w2ais w2alu w2ama w2ani w2ano w2aoa w2aow w2apn w2aqr w2atb w2atz w2aut w2av w2avj w2aw w2ax w2axb w2axn w2bbg w2bda w2bgk w2bgw w2bic w2bn w2bnb w2boz w2bpa w2bpd w2brl w2bs w2bta w2btv w2bue w2buc w2bvy w2bxj w2baj w2cbp w2cbq w2ccb w2ccv w2cd w2cdp w2cdt w2ceg w2cez w2cim w2cjm w2cjy w2clg w2clh w2cmo w2cna w2cnm w2csn w2csz w2ctc w2cth w2cty w2cuq w2cw w2cwk w2cyh w2czr w2db w2dn w2fm w2fn w2gg w2gh w2gk w2gn w2ho w2ic w2jd w2ne w2ob w2qn w2rh w2rz w2uf w2ul w2vj w2vt w2wt w2zf w3aaz w3acx w3aew w3agf w3aho w3ajh w3alp w3amp w3anu w3aoj w3aqk w3asa w3atz w3avf w3avy w3awl w3awn w3bat w3bbb w3bce w3bef w3bda w3bef w3bes w3bfa w3bh w3bhx w3bke w3bin w3buf w3bzs w3cbv w3cm w3exl w3kf w3jr w3lc w3lt w3lz w3md w3mk w3my w3wx w3zk w3zq w3zw w4aaq w4abc w4abf w4abs w4abt w4ael w4ahh w4ahc w4akt w4ald w4ao w4apk w4apz w4ar w4bc w4bs w4bv w4dw w4eg w4fq w4fr w4fv w4kp w4ld w4nn w4oc w4ql w4rx w4sy w4tg w4tr w4vv w4zh w5ach w5bbq w5ms w6ew w8abe w8adg w8aft w8ano w8anq w8ayh w8baz w8bes w8bf w8bfh w8bhk w8bky w8bif w8bjz w8bny w8bqv w8bxk w8cbb w8cft w8che w8ci w8cif w8ciy w8clt w8ctj w8ctn w8cyp w8cxc w8dcb w8dez w8dgp w8dkk w8dsy w8dvb w8lt w8mv w8nud w8qa w8rv w8sk w8tl w8ut w8wk w9aip w9ckz w9eo w9dgy w9dng w9ell w9fqn w9jf w9jl w9an w9um cm2us cm2war cm8by cm8km hc1lc lcfm rx1aa rx1ao sc1fg ti3xa v1ja ve1bv ve1du yx1b yl2bv wsq zl1bn zl2ac zl3am zl3as zl3aw zl3cc zl3cm zl3ro zl4ao zl4bk

W1MS, Chas. H. Horton, 173 North Adams St., Manchester, N. H.

(Heard between June 23rd and July 23rd)

14,000-kc. band

ce1am ce3ch ce3er cm1fm cm2ef cm2fc cm2jm cm2jt cm2mm cm2sv cm2wa cm2wd ct1bx ct1cw ct2ah ct2an ct2aw cx1bu cx2dt d4jpc ear128 ear185 f8ad f8bs f8cs f8ex f8gi f8sf f8sx f8sz f8tm f8tp f8ug f8wu fm8lh g2ay g2cj g2dh g2do g2dx g2ma g2op g2rv g2vq g2xq g5bj g5dd g5fc g5ni g5pl g5er g5sy g5vl g5vm g5vo g5vp g61z g6jg g6ox g6wq g6wt g6wy g6xg g6xq g6xn g6yk g6zs hj3rg k4ug lu2by lu3de lu4ke on4fe on4gn on4ja ok2ac pxr pa0emd pa0ld py1tt py1fb py2bn py2bq st3d ti2bf ti2fg ti3la ti3xa vk3lz x1aa yslgx

VK2OZ, John, Durrant, Olle, c/o Beam Operating Room, Amalgamated Wireless A/sia Ltd., 47 York St., Sydney, New South Wales, Australia

(Heard during March and previous 5 months)

7000-kc. band

ac3gb au1kaz au1nz xau1zb g5bz j1ct j1dn j1dq j1dv j3cc j3co ka1ce ka1em ka1dj ka1el ka1hc ka1hr ka1ja ka1jr ka1pw ka1sl ka1xa ka1zc kawyr ka4hw ka9pb k6boe k6bra k6cdd k6dmm k6dpg k6eln k6fcx k6fez k6nm k6oa k7aml k7ox om1tb pk1cr pk3bq vp1ws ve1ab ve2af ve6ag vzx4x w1bxl w1cek w1sz w2bda w2zg w3bhy w3bm w3gf w4oc w4pr w4rkx w5cpb w6afj w6ahk w6aix w6am w6ao w6aqj w6bae w6baj w6bcy w6bht w6bp w6byy w6cf w6cfk w6cnn w6enq w6czk w6dpr w6dwi w6eqj w6ew w6og w6oz w6sa w6sn w6uh w7oj w7qf w8aav w8clq w9dti w9ga w9sk x6be

W1AWE, N. H. Miller, 25 Phillips St., Providence, R. I.

(Heard during July)

14,000-kc. band

ce3ch cm1by cm1fm cm2by cm2jt cm2ra cm2sv cm2wa cm2ww ctbj ct1aa ct1bg ct1ew ct2aw cx2bt cx2bz d4bbq d4jp d4kj d4uao earco ear16 ear37 ear96 ear116 ear136 ear185 ei8b f8bs f8cs f8ex f8oe f8pz f8qe f8sf f8sz f8tm f8tp f8tv f8tx f8ug f8um fm8ih fx g2ag g2ay g2ko g2ni g2tk g2uv g2yo g5bj g5dd g5kl g5la g5ln g5mu g5ni g5qy g5rv g5vl g5wq g6om g6pa g6rb g6vp g6wn g6wt g6wy g6xg g6xn g6yk g6zs haf2c haf2g haf4g haf6d hb9u hb9j i2aa k4ug k4rj k7mn kn2 lu2ca lu2cd lu2cj lu3de lu3cs lu4ke oa4z oh1nf on4fe on4gn on4jf on4jj pa0emd pa0fx pa0fp pa0ld pa0mm py1br py1ca py1cm py2ba py2bq py2bk py2bn py2bo py2hd py8ia rz1aka sm6ae sm6ua sm6ab uo1cm uowg uown voqh vo8z wdde x1aa x9a ysln zp2aa

I1TU, Dante Bolaffi, Via Roma 31 Torino, Italy

14,000-kc. band

w1pe w1ek w1bh w1kz w1mo w1ph w1avj w1qc w2amz w2tp w2ckr w2bhz w2rs w2bpd w2fd w2bkg w2bak w2cpg w2qf w2fdm w2amr w3buv w8bgt wepo w8box vs6ae vu2ah cx1aa oa4j oa4z j1av j1sp

W1BDL-W1PE, 62 Hermman St., Roslindale, Mass.

ce1ao ce2be ce3ch cm1by cm1fm cm1mn cm2fc cm2jq cm2sh cm2wd cm8uf cn8mi ct1aa ct1ac ct1ae ct1an ct1bx ct1by ct1ew ct2aa ct2an ct2aw cv3x cx2bt d4cht d4zp d4wao ear16 ear18 ear98 ear121 ear125 ear128 ear136 ear185 ei8c f3mta f8cs f8dmf f8dt f8eg f8ej f8ex f8gi f8hr f8jt f8od f8ok f8pa f8pm f8pq f8pz f8rs f8swa f8ax f8tq f8tx f8uk f8wb f8wu fm3mta fm4ab fm8eph fm8hs fm8mst g2ao g2ay g2bi g2bj g2by g2cj g2da g2da g2dh g2gf g2kl g2ma g2on g2op g2pf g2wq g2yq g5bj g5by g5bz g5fc g5hl h5hy g5is g5la g5ml g5ni g5qa g5ar g5sy g5vl g5wn g5yk g6br g6dh g6fx g6hp g6jg g6lk g6lw g6mn g6nf g6nx g6oh g6rb g6rg g6rw g6ut g6vp g6wn g6wy g6xn g6yd g6yk gi5nj haf3d haf3ky haf3my hc1f hc2jc he2jm i1ra kn3 la1g la2z lu3dh lu3fa lu9dt oa4j oa4z ok1aw on4aa on4ar on4bl on4bz on4fe on4fm on4fq on4gn on4ja on4jf on4ru on4sc on4nc on4uf os2pg oz1cc oz7lk pa0an pa0bn pa0dw pa0emd pa0flx pa0fb pa0fp pa0fw pa0od pa0mn pa0tw pa0wd pa0wr pa0qf pxr py1cm py1cr py2ay py2bo py2bf py2bn py2bq py2bt py3aa py3ap py8aa py8ia rx1aa rx1paa sm6ua sp3lz ti2as ti2fg ti2hv ti2tao ti3xa uown velab ve1bn ve1br ve1db ve1dr ve1dw ve2ap ve2bd ve3ep ve3fj ve3ha ve3wn ve3wk ve3wm ve4ae ve4bq ve4dj ve4gf ve4gu ve4hp ve5bh ve9sj vo8an vo8o x1a x1aa x3a x9a x9b w6afs w6ahu w6ahz w6ams w6ann w6ave w6bfq w6bjl w6btk w6ckr w6cpt w6csj w6cte w6cub w6cum w6cut w6cvz w6cyr w6dba w6dbt w6dev w6dev w6dgq w6dgy w6dhp w6dk w6ebm w6een w6eem w6eep w6efn w6eme w6eou w6epq w6ri w6eug w6eup w6eqb w6evd w6exq w6fal w6fan w6ih w6or w6sq w6uf w6up w6yu w7aav w7aaz w7ajn w7aih w7aix w7aul w7asb w7ata w7ats

W6ALQ, Max K. Anders, 1208 Pismo St., San Luis Obispo, Calif.

7000-kc. band

en1ni en1oe d6edd hh7c j1di j1do j1dr j1ee jfa k6aja k6baz k6bbg k6bjj k6cog k6crw k6dgf k6dmm k6egd k6erh k6fcx k7ajw k7akv k7aml k7anq k7atd k7bad k7bbg k7bdw ka1ce ka1el ka1co ka1dj ka1hr ka1jr ka1re ka1sl ka1sw ka1zc om1tb ve2al ve2ca ve3dd ve2er vk2lx vk2sa vk2gj vk3bs vk3gx vk3jk vk3jw vk3jz vk3ml vk3wx vk4hl vk5mf wlaif w1ajd w1alq w1apu w1arx w1atf w1avj w1bg w1clh w1cpi w1cpt w1crp w1ej w1ft w1ga w1jt w1km w1ly w1mx w1si w1uf w1zj w1zy w2adg w2afo w2agh w2afr w2amr w2anx w2aoa w2ary w2atz w2aup w2bex w2bda w2bg w2bnb w2boz w2bpx w2brn w2cex w2bzs w2cjr w2cuj w2cul w2cus w2cte w2cts w2ex w2ezf w2clu w2ku w2rk w2tp w2uy w2wy

• I. A. R. U. NEWS •

Devoted to the interests and activities of the

INTERNATIONAL AMATEUR RADIO UNION

President: H. P. MAXIM *Vice-President:* C. H. STEWART *Secretary:* K. B. WARNER

Headquarters Society:

THE AMERICAN RADIO RELAY LEAGUE, West Hartford, Conn.

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Wireless Institute of Australia
Wireless Society of Ireland

Conducted by Clinton B. DeSoto

A PROJECT with quite considerable international possibilities has been opened up by the completion of preliminary arrangements recently between the A.R.R.L. and the Olympiad Committee in charge of the 1932 Olympic Games to be held in Los Angeles, California, from July 30th to August 14th of next year. The work to be accomplished by amateurs will consist of traffic handling — an activity at present viewed with a certain interest, some envy, and considerable dubiety by the officials of most Union societies.

The program already outlined for amateur coöperation is extensive, Los Angeles amateurs having undertaken to handle as many as 400 radiograms a week from now on for a full year, or until well after the games. Messages of invitation to all prospective entrants are now being handled; a conservative estimate indicates that approximately 100 delegates from each of 35 different countries are expected to be present; but since many more will be invited the scope of the task can be seen to be huge. Arrangements have been made for the erection of an amateur radio station at the Olympic village, which will house the participants, "to make it possible for visiting athletes and their attendants to maintain informal communication with their homes during their visit," and many more messages are expected.

THE RESEAU BELGE HOLDS A GENERAL MEETING

Seated along the base of the "U," left to right, we see: ON4GS, ON4HM, ON4RO, ON4GW, ON4UU, ON4UA, ON4FU, ON4BJ, and ON4BG. Others, unfortunately, not sufficiently well identified.

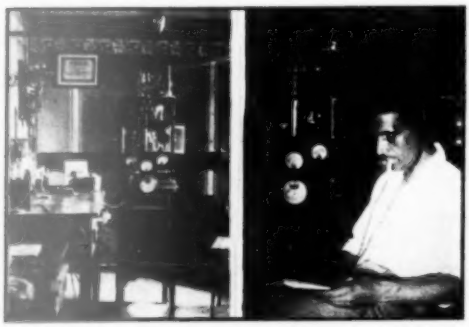
The handling of these immense stacks of radiograms to all parts of the world must be preceded by the working out of two difficult problems. Not only must relay routes between and within every country sending delegates to the games be organized, but some sort of reciprocal international arrangement must be made permitting these messages to be handled in the bulk of the countries concerned. The Communications Department of the A.R.R.L. has already approached representative societies and amateurs in most of the countries with which message traffic is hoped to be exchanged, and arrangements to permit such relaying are being pressed as urgently as possible.

While the I.A.R.U. has at the present time no official connection with this matter (it being purely an A.R.R.L. project), every Union member will watch the outcome of this attempt to broaden international amateur privileges with interest and a great deal of hopefulness. The chairman of the Olympic Games Committee points out that he does not see how any governmental body can refuse the right of its own athletic representatives to avail themselves of amateur radio facilities for communication with their homelands.

We hope that he may be right, and that all the governments concerned will coincide in this viewpoint. The thought of amateur radio help-

ing amateur sport is a particularly attractive one, and offers many angles of attack in presenting the amateur's case in connection with a request for the desired permission. With no compensation involved, no guarantee of speed or actual message delivery, it is certain that no messages will be handled for which recourse to the normal public communications services would otherwise be had, and therefore that no foreign government revenues will be threatened by such traffic handling. Nevertheless, an opportunity for amateurs to be of great public service and utility would be at hand.

And so the preparations continue. Amateurs everywhere, if they have an opportunity to put



PY8IA AND ITS OWNER, ANTONIO LOCKMAN, of Acquidauana, Estado de Matto Grosso, in Brazil. The transmitter uses type '10 tubes throughout, controlled by a 1785 kc. crystal. Ending the first six months of 1931, a total of 512 stations in 31 countries of all continents had been worked.

in a good and helpful word to aid this coöperation with the Olympiad Committee sometime between now and July, 1932, should take advantage of it. A special coöperative effort in connection with the Olympic Games would undoubtedly go a long way towards overcoming the prejudice that now seems to exist in certain countries regarding the international handling of amateur radio traffic.

———

We have a change of address to record, that of the QSL Bureau for Japan. Mr. K. Kasahara, J3DD, has resigned his post as QSL Manager of the J.A.R.L. and has been succeeded by J3CR, so that the official address is now: Kyozo Asamura, 3 Minami Tanabe Cho, Osaka, Japan.

———

Of what use is ten watts in the oceans of the air? G. Edwards, G2UX, is one amateur who can give an interesting answer to that question: he can say that with that amount of power he has been WAC five times; has worked 63 countries; and crowning the list of WAC's, last spring worked all continents inside of twelve hours twice within a period of about one month, using that same ten watts power.

The first "half day" WAC was on March 15th; the last, April 19th. On this latter occasion a ZL, a VK, and three South Americans were contacted within the 12-hour interval. South America had been the continental stumbling-block in two intermediate attempts to duplicate the first record, when the remaining five continents had been worked in, respectively, 5 hours 50 minutes, and 9 hours 35 minutes.

The Hartley transmitter which did the work derives its high tension current from dry batteries; this perhaps explains in part the carrying power of the signals. Another reason for the excellence of G2UX's results is his persistent, indefatigable operating. Incidentally, when we last heard from him every one of these WAC contacts except three had been verified, with the remaining confirmations expected momentarily.

He asks, "I am wondering whether these two WAC's in just over a month in 12 hours or less constitute a record for the input of 10 watts from dry batteries?" Is there anyone to challenge his claim?

———

George F. K. Ball, who handles QSL cards for Kenya, Uganda, and vicinity, also reports a change of address. He is now at: Kololo Hill Radio, Kampala, Uganda, East Africa. His call is VQ4MSB.

———

An interesting example of French amateur ingenuity has come to us in somewhat roundabout fashion from the American magazine, *Popular Science Monthly*. It was pointed out to us by R. L. Daniel, W4DL.

It seems that when a landslide spread death among the inhabitants of Lyons, France, a few months ago, amateurs of the city within a few hours had rigged up apparatus that would give advance notice of any further earth slips. Eight microphones were hurriedly installed on the slopes of hills overlooking the town's buildings. Wires led from the microphones to a central observing post in a small garage. Here volunteers took turns on watch before meters connected in the microphone circuits, which showed a deflection whenever any untoward movement near a microphone set up sound waves, as would happen through the vibration of the moving earth. In the event of a probable landslide the alarm could then be quickly spread by telephone to occupants of the endangered area.

This rapid foresight in the minimizing of impending danger is still another example of the universal up-bearing characteristic of amateurs everywhere when faced with an emergency.

———

Australian Report

By W. G. Sones, *Federal Publicity Officer* W.I.A.

The work of the Federal Technical Development Section during the past month has been

(Continued on page 76)

• CORRESPONDENCE •

The Publishers of QST assume no responsibility for statements made herein by correspondents.

Tuning

9 W. Gayland Road, Needham, Mass.

Editor, *QST:*

I think that a word in *QST* regarding the tuning of transmitters with respect to the interference caused would be helpful in reminding some of the boys again that they are perhaps becoming a little careless. All unintentional, I have no doubt, but it is very annoying when in the midst of a DX QSO to have a continuous signal swing back and forth over the entire band. One I listened to kept this up for about four minutes, and what I thought at the time would hardly be fit for print. Of course it is necessary to tune now and then but I believe a great deal of it could be done with more thought for the other fellow. Let's get together on this!

— *A. C. Stansfield, W1COL*

How to Get Answers to CQ's

224 Van Buren St., Litchfield, Ill.

Editor, *QST:*

While listening in on the phone band one evening recently quite a number of YL's (and no doubt some of these were OW'S) were heard calling the usual CQ. Now the above occurrence is nothing out of the ordinary as there are many fine phones operated by the gentle sex, but the thing that struck me was the number of answers that followed. Every ham using a '99 to a 1-kw. water-cooled bottle came on the air in less time than it takes to tell it and began trying to attract the YL's attention.

After hearing this performance again and again an idea occurred to me, so I hauled out February *QST* and re-read the article "Making a Record of Amateur Signals."

Why not set up the apparatus described therein and persuade some YL, your sister, sweetheart or OW (providing you keep the real purpose a dark secret) and have her record your call interspersed with CQ's. Don't fill the entire record as it would only cause unnecessary interference — and anyhow it won't be necessary with this method. Then when you find it necessary to call CQ just place the record on the phonograph and let it run. What a surprise will be in store for the ham who answers this CQ and finds the OM coming back at him after hearing the sweet feminine voice.

If anyone cares to try this stunt I am sure he will feel amply repaid.

— *Earl S. Weller, W9GCY*

56 Megacycles!

Fargo, N. Dak.

Editor, *QST:*

Just received my July copy of *QST*, and although the 5-meter articles were pretty good, I think the art of amateur radio would progress much faster if Snyder of W9ASP and myself were to bare the results of a week's experimentation in the 56-mc. band. I might say that the experiments were carried out in the laboratories of the North Dakota State College, and that adjacent to said laboratories and in conjunction therewith is a stockroom in which our benevolent instructor, Prof. Rush, had very foolishly left eight aged 201-A tubes. It was hoped that a workable 56-mc. oscillator could be developed in time to be used as part of an exposition. Well, by way of condensing our astounding discoveries into a workable form, I enclose a transcription of our log:

May 2: Built oscillator, split Colpitts, d.c. supply from motor-generator set, 500 v.

May 3: Buried tube used first night with military honors. Inserted in rapid succession the Professor's eight 201-A's (after lowering the plate voltage to a mere 350 volts). Discussed idea of using conveyor belt system to insert tubes in rapid order with idea of keeping oscillator operating continuously.

May 4: Inserted the grand-daddy of all 201-A's. Lasted 6 minutes. W9ASP tests tank with finger. Tries another tube. Unguentine this time. After soothing superheated digit, discussed possible other sources of tube supply.

May 5: Borrowed three 210 bottles from WDAY.

May 6: Lost job with WDAY.

May 7: Changed one of College's triodes into tetrode, by dividing filament into two separate elements.

May 8: College open house exposition gets along fine without 5-meter oscillator.

May 9: Professor discovers burned out bottles.

May 10: Flunked Electricity.

In submitting the above to the vast army of innocent hams who might be misled by the articles in *QST*, I feel that I have done my duty and that all of our "dead soldiers" shall not have died in vain.

— *Don Holaday, W9DOY*

Amateur Coöperation With Air Corps Maneuvers

War Department,
Office of the Chief of the Air Corps,
Washington

June 15, 1931

Mr. Hiram Percy Maxim,
President, American Radio Relay League,
West Hartford, Conn.

My Dear Mr. Maxim:

The 1st Air Division (Provisional), which I had the honor of commanding, has but recently concluded the most extensive and successful maneuvers in the history of the Air Corps. Communications played a most important part in the concentration and control of the large number of aircraft involved. The assistance rendered by the American Radio Relay League in maintaining communication, while the Division was in the New England Area, was most helpful.

The Division Signal Officer, in his report to me, has the following comment to make concerning the work of the members of the League:

"Since the War Department system does not include radio stations at Hartford, Springfield, Boston and Albany, the Signal Officer of the 1st Corps Area arranged for a high-frequency amateur radio net between these points. The personnel (members of the A.R.R.L.) at these places volunteered for this duty. They were on duty when the Division arrived and maintained a twenty-four-hour schedule for the full period of the maneuvers in this Corps Area. The radio service was excellent throughout. They became a part of the Division Communication System and functioned perfectly from the time of the arrival of the Division. Particular notice should be taken of this factor. It shows that the A R.R L. forms a tremendous radio reserve for emergency use."

It is with pleasure that I add my commendation to that expressed by the Division Signal Officer. Please express to Mr. F. E. Handy, Communications Manager of the League, and to the operators who devoted their time to the work, my sincere appreciation of their efficient and willing service. . . .

— *B. D. Foulois, Brigadier General, A.C.*

Plenty of Blanks Available

3411 Garland Ave., Richmond, Va.

Editor, *QST:*

Will you kindly mail me a few blanks to be used in reporting the standard frequency transmissions?

I received the first of these transmissions last Friday evening from W1XP at eight o'clock in schedule A, and was really thrilled with the thought that these transmissions should enable any amateur to operate within the proper frequencies. I think that the stations making these transmissions possible are to be highly commended for performing a service which is invaluable to us, and it is to be regretted that every amateur in this country will not avail himself of such a service.

I am merely a beginner in "ham" radio, or I should say in modern "ham" radio, as I was interested as far back as 1917, but even with as little as I know about the art at present I hadn't the least bit of difficulty in reading the S.F. transmissions, and I expect to use them continually.

So I feel that the least we hams can do to express our appreciation of such a superlative service is to report on the transmissions. Therefore, the report blanks will be appreciated.

— *J. W. Ziesemer, W3BSW*

The R.S.G.B. Contact Bureau

62 Balmoral Ave., Belfast, N. Ireland

Editor, *QST:*

I should be glad if you would allow me a few lines to comment on the letter in your May issue from Mr. A. M. Houston Fergus, G2ZC, which was headed "The Sun and DX." I am not concerned with the claims made by Mr. Fergus with regard to definite proofs of the relation between various disturbances and short-wave propagation, though I feel that the word "proved" in such a connection is a very big word and one which research workers generally are chary of using.

A misunderstanding as to the objects of the Contact Bureau of the R.S.G.B. may have arisen from the statement in Mr. Houston's letter where he likens it to the A.R.R.L. Communications Department. The British transmitter is, *ipso facto*, an experimenter and I think it is fairly well known abroad that he is prohibited from handling traffic; it must then be apparent that there could be no counterpart of the Communications Department in the R.S.G.B.

As the founder of the "Contact Bureau" and writing with the assent of the present Manager, G6PA, I think I am qualified to explain the objects of the Bureau. The Bureau was organized to act as a link between experimenters on the same problem and to facilitate the arrangement of tests and collective experiments. A man interested in, say, 5-meter work would apply to the Bureau and be informed about others doing this work; he would get their names and consequently would discover what work they had done and upon what lines they were working. Information could be pooled and coöperation greatly increased. The experimenters working on any problem are divided into groups of six under a Group Center and all groups of a subject are under a Group Manager who sends a summary of the work done on that subject each month to the Bureau.

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Anode Supply Voltage (Maximum) ..... 200. Volts
Anode Current (Maximum) ..... 20 Microamperes
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Approx. Sensitivity

Dynamic ..... 25. Microamperes–lumen
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Photo-Electric Radiotron UX-867 is a highly sensitive, general purpose photo-cell of the central anode type. An output of from 1 to 5 volts can be obtained with excellent fidelity.

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Voltage Amp. Factor	30
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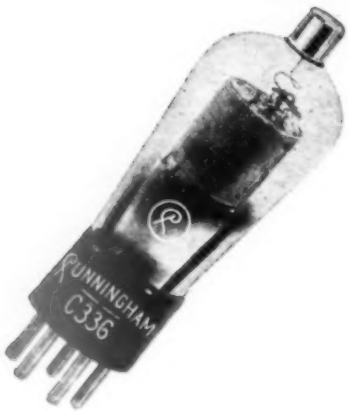

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These summaries are printed in "Contact Bureau Notes," now a feature of the R.S.B.G. "Bulletin."

The Bureau organizes tests for its various groups; our 28-mc. tests, 1.75-mc. tests and 56-mc. tests were recent activities of the Contact Bureau.

Any member of the R.S.G.B. is eligible for membership in one of these experimental groups, but the Bureau is often called upon to put some foreign experimenter in touch with British transmitters interested in the same subject and willingly endeavors to do so when possible. The Bureau is run by the Hon. Manager, Mr. H. C. Page, Plumford Farm, Ospringe, Faversham, Kent, and the work is done in a limited amount of spare time. No charge is made for information, but communications from abroad should be accompanied by an International Reply Coupon.

In closing, I should like to express the appreciation of all connected with the Contact Bureau since its inception, and their hearty thanks to the A.R.R.L. staff for the splendid way in which they have responded to our many requests for coöperation in tests.

— *T. P. Allen, M.Sc., GI6YW*

QSL Stamps

"Killiney," Worsley Bridge Rd.,
Beckenham, Kent, England

Editor, *QST:*

The idea that I am going to propound is not original, because I believe it has been discussed in Holland, but I have seen no mention of it in the columns of *QST*.

Many amateurs after years of operating must have thousands of QSL cards; far too many generally to put on the walls of their shacks, and probably they would like to exhibit the cards easily, which is impossible if they are filed.

We have all been philatelists at some time or other; why not begin again, only instead of collecting postage stamps, collect QSL stamps! The stamps can be printed on 1½" by 2" paper, not perforated or gummed, and each could be sent in a small envelope made to match. A loose-leaf album would then be just the thing to mount them in, and quick reference to the country in question would show whether a station had been worked before, instead of trying to get a stiff neck looking all around the walls and ceiling to find the card. Besides this, it would be much neater, and less bother would be required to fix the stamp in the album than to tack a card on the wall. Those amateurs who are forbidden to tack cards on the wall by their OW's should welcome this idea.

Of course the QSL'ing would be altered materially. Room enough could be left for filling in details of QSA, etc. More neatness would be called for and greater originality could be displayed in the design of these stamps.

I hope that this will be met with some interest by other amateurs. I dare say that I shall get called all sorts of things by some, but it is a new idea and that is what we are all looking for.

— *H. A. Maxwell Whyte, G6WY*

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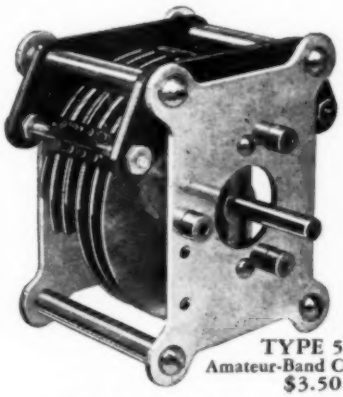

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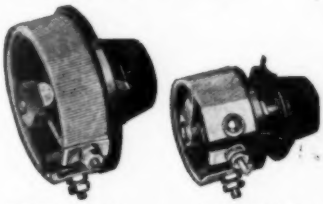

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North Adams, Mass.

A Queer Experience

1595 Lincoln Ave., Lakewood, Ohio

Editor, *QST:*

A short time ago I had a strange experience and have been wondering if any other readers of *QST* have met with a similar occurrence. It has nothing in particular to do with the amateur side of radio, and no doubt many of your readers will doubt the truth of it, but here goes.

One day while in that blank state of mind in which we all get at some time or other while trying to think, I sensed, or probably imagined I heard, a very clean-cut, rather musical note. It was quite faint, but distinct, and went on and off at regular intervals, reminding me of c.w. My very first impression (after my mind had returned to normal conditions) was that the signals which had been impressed on my mind were similar to the time signals of NAA, which are rebroadcast from broadcast stations at noon.

I doubt if you can imagine my surprise when *I turned on the b.c. set and heard the time signals coming forth from the loud speaker.*

Upon investigating the situation, I found that (1) another person in the same room with me had not heard it; (2) no receiver within range of my ears had been on at the time; (3) there was no clock in the room.

I wish to make special mention of point (3) because I realize that if I had been looking at a clock my attention might have been called to the fact that the time signals were on at that time.

Of course this may seem like a wild story, but if anybody who reads this has had a similar experience and lets me know about it, I will know there is at least one person who does not think I am either a prevaricator or a candidate for the bug house.

— *Willson Brigham, W8BON*

Junk

U. S. Veterans Hospital, Gulfport, Miss.

Editor, *QST:*

After a "ham" has been a "ham" for any great length of time, he will accumulate a great variety of odds and ends of radio equipment that he tosses into a box more or less appropriately called "junk box."

The writer, after about ten years of messing around with radio, has one of the largest collections of junk to be seen anywhere. All of this used to be kept in one large wooden box that grew larger and larger as the years went by, until something had to be done about it. So the following arrangement has been instituted and has been found to be very convenient, especially when it becomes necessary to build something out of junk.

A great number of empty cigar boxes were procured; then from the "5 and 10" a supply of blank stickers of large size was obtained. The stickers were put on both ends of the boxes and labelled so that if they get turned around, either

HERE'S A GOOD OPPORTUNITY TO COMPLETE YOUR QST FILES

Space doesn't permit us to mention complete constructional and technical information to be found in these issues, but let's take a peek at some of the 1929-1930 articles: the high-frequency superhet for 'phone reception; modern radio telephone design; how to build a 'phone transmitter at low cost; a simple 1750-3500-kc. receiver for beginners; the single-control transmitter; A.C. high-frequency receivers; new ideas in high-frequency transmitter construction; using your broadcast receiver for short-wave reception; the dynatron frequency meter; complete transmitter with tubes and power supply for $45; a two-tube a.c. receiver — and many more!

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end identifies the contents. Most of the small stuff can be kept in the cigar boxes. The larger parts, however, don't get lost so easily and can be laid out on a convenient shelf.

It has been found to be a very good plan to save all of the old boxes and instruction sheets that come with the instruments that are bought. Sooner or later one wants to know the capacity of that certain condenser or find the template that came with it so that it can be built into a new set. The old box is the place to keep it.

When a junk system such as this is installed and some piece of radio equipment is to be built, it is surprising how easy it is to do the job. Three-quarters of the time won't be spent diving through a great mass of junk trying to find a certain fixed resistor that you are sure is there but can't locate. And you'll have a better transmitter, click filter or what have you if you don't work yourself into a frenzy trying to find a couple of 6-32 nuts.

— *Dr. R. H. Baker, W5BTL*

Linear Detection

Oklahoma City, Okla.

Editor, *QST:*

It recently occurred to the writer that during the mad rush to obtain 100% modulation in amateur 'phone transmitters, sight has been lost of the fact that distortion in square law detectors is a factor of the modulation percentage. Considering the second harmonic as the major factor of audio frequency distortion, let us examine the output of a square law detector which is receiving a 100% modulated wave. The formula for percentage of second harmonic is

$$\frac{\frac{1}{2}(I_{max}+I_{min})-I_{av}}{I_{max}-I_{min}}=\frac{1}{4}$$

From this we see that the second harmonic present in the output of our detector with 100% modulation is 25%, an amount which when passed through a good amplifier is very evident to the ear. With the reduction of our modulation percentage to 50% we find that the percentage of second harmonic distortion has dropped to 12.5%. By doubling the modulation we have doubled the percentage of distortion. Low percentages of modulation mean wasted power and a drastic reduction in the useful range of the transmitter.

Now when linear or power detectors are used, the percentage of modulation does not affect the amount of distortion and very high percentages of modulation may be used. Power detectors might also do away with one stage of audio-frequency amplification and the possible distortion occurring in it.

It is the writer's belief that with the gain available in r.f. amplifiers used at the present time sufficient signal voltage should be available to operate linear detectors. The sensitivity which we might sacrifice would be compensated for by the fact that our output would be free from distortion due to the method of reception.

— *Lee Roy Scott, W5ANY-W5BHN*

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The REL Globe Girdler is a real 10-meter transmitter that furnishes plenty of stable power. It is a completely built and tested laboratory product, compact and efficient. Bus bar shunts are supplied so that filament voltmeter and plate current meters may be mounted as shown. Extra sets of coils for any other bands can be supplied. The "Globe Girdler" is the first transmitter for *ten-meter* band operation. It is ideal from every viewpoint and may be employed as your regular transmitter, standby, emergency, portable or field set.

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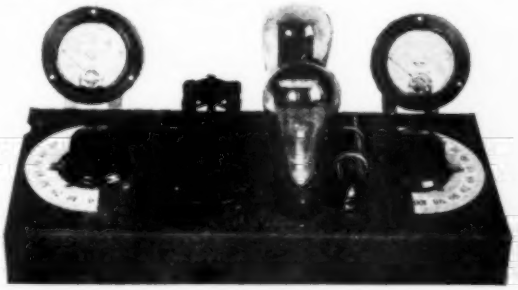

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NATIONAL COMPANY, INC.

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I.A.R.U. News

(*Continued from page 66*)

concentrated upon the construction of substandard frequency meters which, after calibration from standards supplied by the Radio Department, will be distributed to each Divisional technical development section. Several are almost ready to be tested, checked and rechecked, but in view of the latter will not be ready for distribution for some time yet. In the consideration of suitable dials the section was faced with a difficulty of no mean proportions to get a dial which would allow of the necessary fine degree of accuracy in reading. Accurate graduations, reduction of parallax, and vernier drive were the main obstacles, but it is believed that a satisfactory compromise has been effected which will reduce the allowable tolerance to within the limits of .01 or .02 per cent.

A considerable amount of experimental broadcast work on about 1500 kc. is undertaken by members in Australia. The transmission of copyright orchestral and vocal works is subject to control by a copyright owner's association who specifically licensed the W.I.A. to authorize members' stations to perform certain works over which they hold copyright powers. This arrangement has been in operation for some 18 months and the Federal Executive has recently concluded a new contract under which each station will be licensed separately, thereby tightening up control and relieving the Institute of a considerable amount of policing work.

Nearly all Divisions are now undertaking educational schemes of Technical Instruction Classes for radio operators in preparation for various certificates of proficiency. The various schemes in operation have the training of new amateur operators as their primary object, but are in several instances extended to cover more advanced studies for experimental and commercial operators. In spite of the severe financial and industrial depression being experienced in the Commonwealth, the classes, which incidentally are not all free of charge, are exceptionally well patronized. The number of passes from the examination of the Radio Department for the Amateur Operator's Certificate of Proficiency is most encouraging.

Local publicity is being satisfactorily undertaken by all Divisions, and a favorable amateur attitude is being fostered in the general public through local press, broadcast stations, and experimental 'phone stations working in the 1500-kc. band.

The Victorian Division has under construction a new transmitter using relatively "high" power, which will be used by both the Federal Executive and the Division extensively for broadcast 'phone work on high frequencies. Schedule details will be available later.

Summarized, a radioed report received through WSBAZ listing the monthly traffic totals of the

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Filament **7.5 volts — 2.5 amperes**

Special 210 Oscillator

For increased output. Constructed with double-size molybdenum plate and thoriated tungsten filament. Ideal for amateur transmitters.

TYPE 281-M — MERCURY VAPOR RECTIFIER designed to replace 281 to provide greater power. Max. Peak Inverse Voltage 2500; Max. Current 250 M.A.; Filament 7.5 volts & 1.25 amp.....$3.50

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$21 845B Modulator and Power Amplifier ***$12.60***

We guarantee it and so does manufacturer

203A Tubes, fully guaranteed. Has oversize plate and made to stand up	$25.00
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Thor Output Transformers for Pentode Tubes to dynamic speaker	3.60
M. & H. 866 Fil. Transformers 10,000 V. insulation	4.35
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M. & H. 750-0-750-150 Watt Plate Transformers	7.00
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THE Thordarson T-4843 output transformer is designed to couple the new single power pentode tube to the voice coil of a dynamic speaker. The turn ratio of the transformer is 30 to 1 and the impedance ratio is 900 to 1. The Thordarson T-4831 for push-pull pentodes has a turn ratio of 42.4 to 1, and an impedance ratio of 1800 to 1.

These transformers are designed so that the reflected load on the pentode is 8000 ohms when connected with a speaker whose voice coil has an impedance of 8.9 ohms. Sizes 2½ x 2½ x 3 inches. Weight — 2 pounds. Each, $6.00.

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individual official Australian traffic stations indicates that the dozen stations handled a total of 499 messages in the last reporting month prior to date of writing. This represents an appreciable increase.

Belgian Report

By Paul de Neck, President Reseau Belge

There is nothing very new to be said about the performance of the two principal bands. As in the previous year, we are passing through a dead period (around June) and the falling off in quantity of the QSL cards passing through our service is very symptomatic.

A few DX contacts have been made during the night on the 14-mc. band, and the usual 'phone and code traffic on 7-mc. has continued.

The May, June, and July numbers of our official organ, "QSO," have been delayed as the result of a strike in our typographical plant in Brussels, and were not scheduled to be out until the end of July.

Special mention must be made of the achievement of our C. M. at Tournai, Mr. G. Leclercq, ON4GN. He accomplished a successful contact with K6ERH of Hawaii; fine business, OM.

Father Mathot, old 4TK, now ON4CAB, is at present in the Belgian Congo. His full QRA is: Catholic Missions at Hemptinne St. Benoit, by Tshimbulu, Kasai, Belgian Congo. He reports having heard the following American stations on May 7th at about 2200 (local time): W3CBM and VE1DR, together with many Europeans, including a dozen Belgian stations.

A special telegram of congratulations was sent Professor Piccard of Brussels University after his successful ascent into the upper regions of the atmosphere. It read as follows (translated): "Cordial felicitations to the admirable explorer of our Heaviside layer. (Sig.) Reseau Belge."

We wish to point out to our friends in all the I.A.R.U. Sections and elsewhere that the QSL service for Belgium is through the Reseau Belge, 11 Rue du Congres, Brussels, Belgium.

French Report

By P. Godfrin, F8BJ

French amateurs extended coöperation to the pilots on the airplane flight from Paris to La Reunion which took place at the end of June. Two-way contact with the plane was arranged on the following schedule: Transmissions from the plane on 14 and 28 meters at 2200 G.C.T., with the operator listening inside the 14- and 7-mc. amateur bands for replies from amateur stations. The crew of the airplane consisted of Faheres, Belporte, and Lenier. Broadcast transmissions from the plane were made every 15 and 45 minutes after the hour mark. Special information was relayed to amateurs along the French urgency network at 1000 G.C.T., and information concerning the arrangements was published by "Radio REF."

The Citroen Central Asia expedition (known as

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"Superior by Comparison"

NEW PRICE LIST EFFECTIVE JULY 1, 1931

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We are proud of the confidence our customers have shown toward us, we extend to them our sincere thanks for their patronage thus making this reduction possible.

New prices for grinding **Power** crystals in the various frequency bands, together with the old prices are as follows:

OLD LIST	*(Frequency Range)*	**NEW LIST**
$55.00	100 to 1500 Kc	**$40.00**
$60.00	1501 to 3000 Kc	**$45.00**
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The above prices include holder of our Standard design, and the crystals will be ground to within .03% of your specified frequency. If crystal is wanted unmounted, deduct $5.00 from the above prices. Delivery two days after receipt of your order. In ordering please specify type tube, plate voltage and operating temperature.

Special Prices Will Be Quoted in Quantities of Ten or More

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The prices below are for grinding a crystal to a frequency selected by us unmounted (if wanted mounted in our Standard Holder add $5.00 to the prices below), said crystal to be ground for **Power** use and we will state the frequency accurate to better than a tenth of one percent. **Immediate shipment can be made.**

1715 to 2000 Kc band.....$12.00 each
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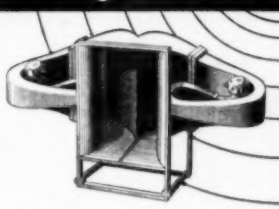

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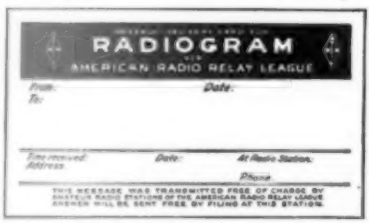

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AMERICAN RADIO RELAY LEAGUE
WEST HARTFORD, CONN., U. S. A.

the Haardt Trans-Asia Expedition in this country. — *C.B.D.*) has passed Kabul and continues with its regular broadcasts at 1820 G.C.T. on 8265 kc. on even days and 12,710 kc. on odd days. The call letters are FPCF. Up to now, the only reception of its signals has been by our secretary, Robert Larcher, F8BU. In view of the interest in this reception all reports are welcome.

During the past spring our Traffic Manager, F8EX, reports good traffic conditions with Asia (QSO's with J1EE, J1DP, J5CC, J1DY, and especially VS6AE) on 14-mc., and likewise with North America on 7 and 14 mc. Several QSO's with station TF3TP of Iceland have also been reported.

Communication with South America and Oceania, with the exception of Hawaii, remains difficult.

— - - —

German Report

By* Dr. Curt Lamm, *Foreign Secretary D.A.S.D.

We have two outstanding events to report this time.

On May 23rd through 26th our Sixth Annual Convention was held at Hamburg, and turned out to be a great success. Nearly ninety amateurs gathered from all sections of Germany. In addition, we had the pleasure of welcoming quite a number of foreign amateurs, among whom were: SM6UA, Sweden's "Grand Old Man" and his OW, Gothenburg; UN7DD, Zagreb; F8BJ, Paris; G5XD, Douglas; G2RV, Wallasey; HB9N, St. Gallen; UO1JF, Vienna.

By the very friendly attitude shown towards the amateurs by the representative of the German postal authorities, it is hoped that the position of the "D" amateurs will soon improve.

All old members of the council of the D.A.S.D. were reëlected. O. A. Klotz, D4ABG of Heidelberg, was elected District Manager of the Free State of Baden to replace D4ABF of Karlsruhe, who is going abroad.

Some very interesting lectures were given, and amongst which must be mentioned a lecture by M. Vantler on the broadcast experiments carried out on 7 meters by the Telefunken people in Berlin. Another interesting demonstration of the behavior of ultra-high frequencies was given by R. Rapcke.

Later, lectures by H. Reifenberg and H. Evartz, on screen-grid transmitters and wavemeters, respectively, both evoked very interesting discussions. A most elaborate and remarkable exhibition of the apparatus used by the Hamburg gang awakened much interest amongst all those attending this joyful convention.

The meeting was happily concluded by an excursion to Heligoland Island. May we again through this medium heartily thank all those Societies and amateurs who have kindly thought of us at this happy occasion.

More recently, we were most pleased to welcome here Major K. B. Warner, who came to Berlin after having again successfully represented

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Crystal Mountings **Quartz Crystals**
Constant Temperature Ovens **Quartz Bars**
Frequency Control Equipment **Quartz Resonators**

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Crystals and Mountings calibrated and furnished for following bands, at accuracies of plus or minus .1%, .03%, .01%:
50–200 kilocycles. Low Frequencies.
200–550 kilocycles. Intermediate Frequencies.
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AMATEUR BANDS

Ground by experts and calibrated from precision standards. Crystals for amateurs ground to approximate frequency and calibrated to better than 1/10 of 1%.

1715–2000 kilocycle band	**$10.00**
3500–4000 kilocycle band	**12.50**
Plug-in dust proof mounting as illustrated above	**5.00**
One inch oscillating blanks	**4.00**

Grinding instructions furnished with crystal blanks.

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550–1500 kilocycle band — calibrated at any temperature plus or minus 500 cycles desired frequency complete with plug-in dust proof mounting — **$45.00.**

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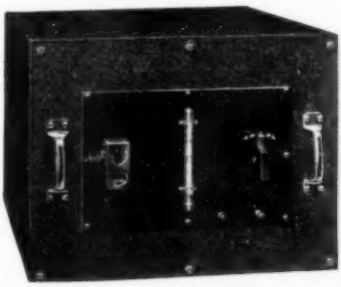

Model C-7-A 35 to 65 Degrees C. Accommodation for two crystals **$125.00**

You may order direct from this ad C. O. D.

FREE Send name, no obligation, for full information on crystals, holders, blanks, heater ovens, etc.

AMERICAN PIEZO SUPPLY COMPANY
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Resistors

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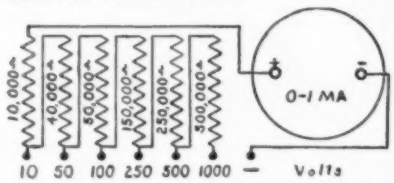
are recommended and extensively used for radio production and service test equipment. The accuracy and dependability of the testers described on page 1085 June and page 118 July Radio News depend upon SHALLCROSS RESISTORS.



Send 4 cents in stamps for Bulletin 100-C and other literature describing the multi-range meter circuit, similar to the diagram above.

Shallcross Mfg. Company
ELECTRICAL SPECIALTIES
700 PARKER AVENUE
Collingdale, Pa.

NOT SO MUCH QRM when you use good parts—and there's no shortage of good ones here. Everything for the amateur.

Weston, National, REL, Electrad, Mershon, Vibroplex, Aerovox, Munzig, Thordarson, Rectobulb, Pilot, DeForest, Amertran, Signal, Carter, Ohmite, Flechtheim, G-H, Allen-Bradley, etc.

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POWER AMPLIFIERS PACKS SUPPLIES **A SPECIALTY**

Exclusive Eastern Distributors for

PURADYNE PRODUCTS

Reg. U.S. Pat. Off.

The PURADYNE plates supply transformers have been designed so that they may be adapted to the most common applications in rectifying and transmitting circuits. The primary windings are designed for operation from a 60-cycle 110–115 volt supply. All units are designed for continuous operation at full load. The insulation test at a potential of 10,000 volts insures satisfactory operation under all possible conditions.

Cat. No.	Out Put Voltage	Filament Voltages	Wattage	Price
80	2500–0–2500 1500–0–1500	———	850	$13.00
50	1500–0–1500 1000–0–1000	———	500	$9.50
10	750–0–750	7½V. c.t.–7½V. c.t.	325	$5.00
9	600–0–600	7½V. c.t.–7½V. c.t.	200	$5.00
45	375–0–375	2½V. c.t.–2½V. c.t. 5V.	100	$3.50

PURADYNE 250-mil choke 30 Henrys 110 ohms d.c. resistance in metal case with stand-off insulators . . $3.00
PURADYNE 30 Henry 125-mil choke 260 ohms d.c. resistance $1.00
PURADYNE 30 Henrys double choke as above $1.75
PURADYNE filament transformers 10,000V. insulation metal cases with stand-off insulators: All guaranteed for one year against any defects. ALL CENTER TAPPED
2½V. — 12 amps for 866s $3.50
7½V. — 6 amps for 210s, 250s, 281s $3.50
10V. — 7½ amps for 203As, 211s, 852s, 860s, 845s . . $4.00
5V. — 20 amps for 872s $6.00
12V. — 10 amps for 204As $4.50
14V. — 10 amps for 212Ds $5.50
PURADYNE special filament transformers 2–7½V. c.t. at 4 amps each winding $4.00
PURADYNE .001; .002; .006; 6000V. plate blocking condensers in metal cases with stand-off insulators . . . . . $.75
WESTERN ELECTRIC 1 mfd condenser 21AA 750V. a.c. test . . . . . $.50
ACME PARVOLT 2 mfd 1000V. working unmounted condensers but sealed in paraffin, guaranteed . . . . . $.75
PURADYNE guaranteed transmitting filter condensers metal cased with stand-off insulators. All condensers rated at continuous working voltage:

Capacity	1000 Volts	1500 Volts	2000 Volts	3000 Volts
1 mfd	$1.25	$2.00	$3.00	$6.00
2 mfd	2.00	3.00	5.00	12.00
3 mfd	2.50	3.50	6.50	28.00
4 mfd	3.25	5.50	9.00	36.00

PURADYNE 200-watt center-tapped transmitting grid-leaks in metal cases with stand-off insulators:

5,000 ohms	$1.75	20,000 ohms	$2.50
10,000	2.00	30,000	2.75
15,000	2.25	50,000	3.75

OHMITE 150-watt Gridleaks 5,000; 10,000; 11,000; 16,000; 17,000; 21,000; 100,000, Ohms each . . . . . $.75
PURADYNE microphone transformers designed to fill the needs of broadcast stations, PA systems, etc. The frequency characteristics are exceptionally flat through the entire audio frequency band. Primary can be supplied in 100- or 200-ohm impedances; secondary impedance 400,000 in neat shielded cases, single button $1.75
Double button $3.50
PURADYNE mike stands; table model $2.00; floor model, adjustable to eighty inches, statuary bronze finish . $3.50
NOTE: JEWELL carries the most complete line of power amplifiers and PA systems in the city. Send for literature.
SAMSON-PAM AMPLIFIERS, NEW; PAM 16 uses: 1–281, 2–210, 1–227, List $125.00 . . . . . $37.50
PAM 19 uses, 2–281, 2–250, 2–227, List $175.00 . . . . $49.50
WEBSTER R-250 three-stage resistance coupled amplifier using a 250 output tube. This amplifier gives the clarity and frequency response only possible with a resistance coupled amplifier; can be supplied with microphone input transformer on request $25.00
WEBSTER D-250 is a three stage double push-pull amplifier. The first stage uses a single 227 tube. The second stage is push-pull using two 227 tubes. The third or output stage is push-pull using two 250 tubes. It may be used with a phonograph pickup radio or microphone. It will operate satisfactorily two to ten dynamic speakers. $55.00
WESTERN ELECTRIC 211E 50-watt tubes guaranteed. $8.00

We can Supply Anything — At Jewell's Prices — Ask for It
Compare the Prices
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Jewell Radio Company

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the interests of the amateurs at the Copenhagen C.C.I.R. meeting. We hope he liked his stay in this country, and at the same time the D.A.S.D. expresses again its sincere thanks to him for his gallant fight for our place in the Sun.

The Annual Assembly of the Sdruženi Krátkovlnnych Experimentátorů Čs., one of the amateur societies of Czechoslovakia, was held in the Technical School at Prague on May 20th. The occasion was properly celebrated by the amateurs in attendance, and a new Chairman's Council was elected, as follows:

Ing. J. Bísek, President	Valenta
Ing. L. Pešek, Vice-President	Šilhavý
B. Mayer, Secretary I	Telenský
O. Batlička, Secretary II	Stibitz
F. Cerveny, Treasurer	Stětina
J. Rokos, QSL Manager	Schwarz
Ing. J. Budík, Technical Manager	Ing. Antič
B. Erbs, Library	Friedberger

Southeastern Division Convention

Jacksonville, Florida, September 18th and 19th

ON to the George Washington Hotel, Jacksonville, Fla., for the 1931 Southeastern Division Convention, to be held under the auspices of the Jacksonville Amateur Radio Operators Club, which extends to all amateurs of the division a cordial invitation.

The Southeastern Division does not hold many conventions, and the committee in charge realizing this, has prepared a program which will interest all delegates, young and old. All we ask of you is to show up bright and early Friday, September 18th, and register. You will have a chance to meet your Director, Mr. Dobbs. A.R.R.L. Treasurer-Fieldman A. A. Hebert will be the official representative from headquarters, and many good speakers will be present. Transatlantic and coastwise steamers will throw open their radio shacks for inspection; radio-equipped airplanes for flights, tests and inspection; up-to-the-minute sound equipment for inspection and *contests* by the bushel, with suitable prizes to each winner. The total cost for the banquet, trips, etc., for the two days of activities is $5.00 per person. The leading hotels have offered special rates for the Hams attending the convention, and you are assured of a royal welcome and good time. Come, and we will do the rest. Further information from Messrs. Mai, Leighton and Winter of the Jax Amateur Radio Operators Club, Hotel George Washington, Jacksonville, Fla.

Missouri-Midwest Division Convention

Rolla, Missouri, September 11th and 12th

MISSOURI! Missouri! Who is shouting? We, the South Missouri Association of Radio Amateurs. Well, what is it all about? A grand and

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Special Amateur Receiver

An E. M. Sargent Design, a High-Grade Receiver built for Station Owners Who Want the BEST + + + + + + + + + + +

Look At This List of Features:

1. *Absolute "One-Spot" Tuning.*
2. *10 K.C. Selectivity.*
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Sending Is *EASY*

With the *Easy-Working Genuine Martin No. 6*

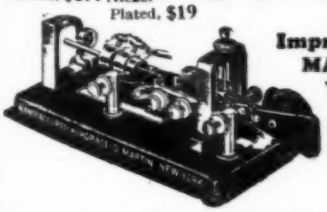
New VIBROPLEX

Reg. Trade Marks: Vibroplex; Bug; Lightning Bug

The smoothest, easiest-working bug on the market. Easy to learn. Easy to operate. Makes sending easy.

In Colors *Blue Green Red*

Black or Colored, **$17.** Nickel-Plated, **$19**



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Black or Colored, **$17**
Nickel-Plated, **$19**

Special Martin Radio Bug — Extra large, Specially Constructed Contact Points for direct use without relay. Black or Colored, **$25**

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Guaranteed New Radio Bargains

Aero Shortwave Converter Superheterodyne. Converts your AC or DC radio set into a short wave superheterodyne 15 to 200 meters.....**$12.50**

Auto Radio — Uses 3-224, 2-227 tubes and 1-245 Power tube, single dial, tremendous volume. Compact. Fits any car. We guarantee this set to pull in stations within a radius of 1000 miles and that it will deliver the volume and tone qualities of an Electric set, or your money refunded.....**$20.00**

International Microphone — Two button for public address, systems and transmitters. Speech or music.....**$9.75**

Complete Phone and CW Transmitter 15 to 30 Watts. **$39.50** Including tuned plate, tuned grid oscillator with provision for crystal control. Wired for one or two UX 210 tubes. One or two UX 250's as modulators, two stages of speech amplification. Mounted in beautiful two-tone Walnut cabinet. Has ample space for AC power supply. Price includes one Stromberg-Carlson microphone.

Power Supply Unit for 15 to 30 Watt Transmitter **$19.75.** Will deliver 600 volt 150 milliamperes for plate current. Has filament for 281, 210, 250, 277, and 226 tubes.

World Wide 2-Tube Short Wave Receiver. $11.75. A two-tube receiver in a beautiful shielded metal cabinet. An ideal all around set which will give loud speaker reception on many stations. Very flexible in tuning. Complete with a set of 6 clip-in coils. Covers 14 to 550 meters. Can be used with any standard base tubes.

Tubes UX Type, 30 day replacement guarantee, No. 210, **$2.25;** No. 250, **$2.35;** No. 281, **$1.85;** No. 280, **95c;** No. 245, **$1.25;** No. 224, **$1.25;** No. 227, **75c;** No. 226, **65c;** No. 171, **75c.**

Low Power Transmitter, adaptable for phone or code. With plug-in Coils.....**$14.75**

Short Wave Sets, one tube complete with 5 coils, 14 to 550 meters.....**$6.45**

Stromberg-Carlson telephone transmitter on desk stand, **$2.75**
B Eliminator, Dry. 180 volts, will operate up to 10-tube set, with 280 tube, fully guaranteed.....**$6.75**

AC-A. B. C. Power Packs, completely assembled.....**$8.75** 250 V. B. also has A. C. filament for up to 9-tube set. Can be used as B eliminator. Make your battery set all electric, or build your A. C. set around this pack. 280 tube for this pack, **95c** extra.

Aero Hi Peak Audio Chokes for your shortwave receiver gives the peak amplification which is many times greater than you get with just ordinary transformer amplification.....**$3.00**

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4240 Lincoln Ave. Dept. H. 8 Chicago, Illinois

Your A.R.R.L. EMBLEM

The League Emblem comes in four different forms. Its use by Members is endorsed and encouraged by the League. Every Member should be proud to display the insignia of his organization in every possible way.

THE PERSONAL EMBLEM. A handsome creation in extra-heavy rolled gold and black enamel, ½" high, supplied in lapel button or pin-back style. The personal emblem has come to be known as the sign of a good amateur. It identifies you — in the radio store, at the radio club, on the street, traveling — you can spot an amateur by it. Wear your emblem, OM, and take your proper place in the radio fraternity. Either style emblem, $1.00, postpaid.

THE AUTOMOBILE EMBLEM. 5 x 2½", heavily enameled in yellow and black on sheet metal, holes top and bottom, 50c each, postpaid.

THE EMBLEM CUT. A mounted printing electrotype, the same size as the personal emblem, for use by Members on amateur printed matter, letterheads, cards, etc. $1.00 each, postpaid.

THE "JUMBO" EMBLEM. How about the shack wall or that 100-footer? Think of the attention this big yellow-and-black enamel metal emblem will get! 19 x 8¼", same style as Automobile Emblem. $1.25 each, postpaid.

The American Radio Relay League
West Hartford, Conn.

glorious convention is to be held at Rolla on Friday and Saturday, September 11th and 12th. All Missouri amateurs and those within the Midwest Division are cordially invited to attend. The convention committee has worked hard to prepare a program to satisfy every one. Good speakers have been secured; there will be movies, Army and Navy representatives, and the A.R.R.L. is sending Everett L. Battey, Assistant Communications Manager. Everybody will enjoy meeting "EV." This will be your opportunity to meet and enjoy the good fellowship which is inherent amongst amateurs. Come, and we will do the rest.

Convention headquarters will be at the Hotel Edwin Long, Rolla. Further information may be obtained by writing Cecil R. Cannady, W9EYG, 300 Sixth Ave., Monett, Mo.

West Gulf Division Convention

Oklahoma City, Oklahoma, September 11th and 12th

THE above dates and the city should be marked all over the shacks of every ham in the division. While this is the fifth annual convention of the division, it is the first real A.R.R.L. affair to be held in the north section of the division. *Amateurs*, are you going to help us make this convention a huge success? A cordial invitation is extended you. The committee is hard at it preparing a program which will satisfy every one. Director Corlett will be with us; A.R.R.L. is sending A. A. Hebert, Treasurer and Fieldman, and other interesting speakers, visits and stunts will make that part of the program satisfactory. The big banquet will be at the Hotel Huckins, and the best part of it is the cost — $3.50 for everything. Watch for our publicity, and if you want more information write Wm. J. Gentry, SCM, 538 No. Pottenger St., Shawnee, Okla.

Book Reviews and Notices

Radio Frequency Measurements, Second Edition, by E. B. Moullin. Published by Charles Griffin & Co., Ltd., London (J. B. Lippincott Co., Philadelphia, Pa.). 487 pages, 289 illustrations. Price, $12.50.*

* Obtainable from the *QST* Book Department.

This completely modernized and greatly enlarged edition of Prof. Moullin's work, the first edition of which established itself as the standard of its kind upon its appearance in 1926, comes even closer than its predecessor to being the complete reference for exact radio-frequency measurements. Characteristically mathematical but with a style of worded explanation that makes the equations seem almost supplementary, the book has practical value not only to the mathematical but also to the practicing experimental mind that must have clear language and illustrations to make the information useful.

A new chapter has been added developing the electromagnetic equations and calculating the fields near circuits and antennas, especially interesting and useful for its discussion of the mechanism of radiation. Another new chapter

Everything You Need to Become an Expert

Wireless or Wire Operator

Instructograph Code Transmitter

Ten Rolls of Tape

Complete Instructions

Only $24.50

The unit illustrated includes the machine, ten rolls of double perforated tapes (approximately 2,000 feet of characters), and a large booklet of instructions. Booklet contains a comprehensive and thorough course of instructions for study and practice with the Instructograph and interpretation of the tape matter, as well as complete directions for the care and operation of the Instructograph. It also contains illustrations and complete directions for building and installing an oscillator unit.

We can supply a "Buzzer" or oscillator, if desired, at a reasonable price, but you can easily build your own by following directions in Booklet.

Amateurs write for information regarding our "CQ" call tapes

Extra tapes — either code, $1.00 each

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815 Leland Ave. ***Dept. Q-1*** **Chicago, Illinois**

Massachusetts Radio and Telegraph School

18 Boylston Street, Boston

Send for Catalogue

Tel. Hancock 8184 ***Established 1905***

FINEST QUALITY QUARTZ CRYSTALS

Scientifically Prepared and Unconditionally Guaranteed

40 meter band	**$15.00**
80 meter band	**9.00**
Broadcast band, 500 cycles accuracy	**40.00**
1 in. tested blanks	**3.50**
Mounts, table or plug-in types	**3.00**

Crystals of any practicable specifications made to order

J. T. Rooney, B. Sc., 4 Calumet Bldg., Buffalo, New York

"A pioneer crystal grinder"

UNIVERSAL MICROPHONES

12 Types — A Complete Line with an Outstanding 3-YEAR RECORD for Every Possible Use. . . . Also Accessories for Every Need. . . .

"HANDI-MIKE"

Maximum volume. Minimum hiss. Scientifically damped. Truly natural in tone and the most rugged microphone yet devised. No delicate parts to be damaged if dropped, jarred or roughly handled. For announcing, transmitting or home recording. Our engineering department is at your service.

New catalogue covers 12 models from $5.00 up.

Write for our complete catalogue

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NEW!!

Condenser Trouble Banished

We have been appointed sole distributors for the United States of the New CORAL-GABLES *self healing*, high voltage condensers. The only condenser of its type on the market. Now being sold at specially low introductory prices. Unconditionally guaranteed for 1 year.

WORKING VOLTAGES

Mfd.	*1000 D.C.*	*1500 D.C.*	*2000 D.C.*	*3000 D.C.*
1	$1.95	$2.45	$4.95	$8.90
2	3.15	4.35	7.45	16.50
4	4.95	6.25	12.95	30.25

GENUINE RCA RADIOTRONS. — UX210, $4.11; UX281, $2.94; UV224, $1.17; UX280, 32c; UX245, 82c; UV227, 73c; UX250, $3.53.

COLUMBIA POWER TRANSFORMERS

Type	*Wattage*	*Output Voltage*	*Filament voltage*	*Price*
A	200	600–0–600	7½ ct & 7½ ct	$3.75
B	250	750–0–750		4.95
C	350	1000–0–1000		6.25
D	500	1500–0–1500		9.50
E	750	2000–0–2000		13.00
F	250	750–0–750	7½ ct & 7½ ct	5.75

FILAMENT TRANSFORMERS: An efficient sturdily constructed job. All secondaries centertapped. Deduct 10% from these prices if no centertap is wanted.

Voltages	*12 Watts*	*25 Watts*	*50 Watts*	*100 Watts*
2½	$1.25	$1.95	$2.50	.....
2½ and 2½	1.50	2.25	2.75	4.95
7½	1.25	1.95	3.25	5.25
7½ and 7½	.....	2.25	3.95	6.25
10	.....	.....	3.40	5.95
12	.....	.....	.....	6.30

BRISTOL double button microphone transformer. May also be used for single button, special, **$1.40**

RCA VICTOR power transformers, 150 watts. Just the job for that 245 push-pull transformer transmitter. Supplies 750 volts center tapped, 2½ centertapped, 5 ct, and 2½, 1½, and 1½ **$2.25**

GENERAL ELECTRIC — 30 henry, 150 mill chokes. Very neat, black finish **$1.50**

SPECIAL: 2 Mfd, 1250 volts working voltage, in neat cardboard container **$1.50**

GRID LEAKS: Hardwick Hindle, wire wound, for all tubes up to 250 watts. 10,000 Ohms, 1" x 6", **95c**; 5000 Ohm, **65c**. Kroblack 50 Watt, 50,000 Ohm, **75c**

COLUMBIA: 30 Henry, 200 Mill chokes. Very rugged. Specially priced **$2.40**

COLUMBIA: 30 Henry, 120 Mill chokes. Mounted **$1.30**

Send for our new fall catalogue. It's free!

Immediate Service **Terms: Cash or C.O.D.**

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NEW

JACKS, PLUGS, BINDING POSTS, CONNECTORS, ETC.

Every engineer, serviceman, amateur and experimenter will need this line of plugs and jacks. Over 75 types. *Will carry heavy current.*

SEVEN DISTINCT COLORS

Write for catalog showing complete line of connector needs and distinctive radio accessories, at low prices.

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G.E. TRANSMITTING • TUBES • 75

NORMAL CONSERVATIVE RATING 5 WATTS. PLATE VOLTS 550. FILAMENT 7.5 VOLTS. FOR OSCILLATORS OR MODULATORS. **Price, each**.....**$.75**

FILAMENT TRANSFORMERS, *each,* **$1.00**
15 watts. 7.5 volts center tapped. Just the thing for your 210's, 281's, or 250's.

RCA power chokes, 30 henrys at 250 mils. **$2.50**

5 henrys at 1000 mils. Shipping weight 18 lbs.....**$3.00**
All fully mounted and shielded.

RCA LICENSED TUBES

UX226, UY227, UY224, UX280, UX171A, *Each* **$.65**
UX245, UX230, UX231, UX232, 335, *Each*.....**$.75**
THE NEW POWER PENTODE U247, *Each*....**$.95**
UX210's extra large plate, 15 watt rating.....**$1.50**
UX281's 100 mil. output rating.....**$1.50**
UX250's For your modulators.....**$1.50**
Variable MU super screen grid 551.....**$1.00**
U-866's HEAVY FILAMENT.....**$4.75**

RADIOBUILDERS CONDENSERS

Mfd.	*800v.*	*1000v.*	*1500v.*	*2000v.*	*3000v.*
1	$1.10	$2.00	$2.95	$4.25	$6.75
2	$1.55	$3.00	$3.95	$6.15	$10.25
4	$2.75	$4.00	$5.50	$8.70	$16.00

All above in heavy metal containers with large terminal insulators. All condensers tested at 40% overload before shipment. All guaranteed.

MILLIAMETERS 0–100, 0–200, 0–300, 0–400. *Each*.....**$1.00**

AC VOLTMETERS 0–6, 0–10, 0–15. *Each* **$2.50**

DC VOLTMETERS 0–300, **$3.00,** 0–500, $4.00, 0–750, $5.00.
All meters flush panel mount. Black flange.

10,000 or 15,000 ohm transmitting grid leaks.....**$.60**

100 feet seven strand antenna wire $.20

UX or UY sockets.....**$.10**

Neon tubes for wavemeters in handy carrying case.....**$.50**

Copper ¼ inch tubing wound 3¼ inches diameter, turn.....**$.09**

Audio transformers, broadcast quality, *each*.....**$1.00**

Transmitting keys, Signal corps model, *each*.....**$1.00**

2.5 volt pilot lamps, Mazda, *each* **$.05**
6 volt.....**$.10**

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contains the collection of the formulas for calculating the effective impedance, resistance and resonance conditions of complex circuits, freeing succeeding chapters from the detailed analyses that detract attention from the main discussion. The chapter on the vacuum tube oscillator ("valve generator" in the author's British terminology) has been expanded considerably, discussing completely the conditions for oscillation for various oscillator circuits.

Illustrative of the author's straightforwardness is this sentence from his preface: "At very high frequencies it is impossible to regard capacity and inductance as separate entities, and attempts to do so lead to the same type of absurdity as would result in mechanics from postulating massless springs or rigid masses."

—*J. J. L.*

Election Notices

(*Continued from page 28*)

Dominion of Canada have the privilege of nominating any Canadian member of the League as a candidate for Canadian General Manager. The following form for nomination is suggested:

(*Place and date*)

Executive Committee,
American Radio Relay League,
West Hartford, Conn.

Gentlemen:

We, the undersigned members of the A.R.R.L. residing in the Dominion of Canada, hereby nominate ....., *of* ....., *as a candidate for A.R.R.L. Canadian General Manager for the 1932–1933 term.*

(*Signatures and addresses*)

The signers must be League members in good standing. The nominee must be a *Canadian* member of the League in good standing, and must be without commercial radio connections. His complete name and address should be given. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon of the first day of November, 1931. There is no limit on the number of petitions that may be filed, but no member shall append his signature to more than one such petition.

4. Mr. Alex. Reid, VE2BE, of St. Lambert, P.Q., is the present Canadian General Manager.

5. This election is the constitutional opportunity for members to put the man of their choice in office as the Canadian member of the A.R.R.L. Board of Directors. Members are urged to take the initiative and file nominating petitions immediately.

For the Board of Directors:
K. B. WARNER, *Secretary.*

West Hartford, Conn., 15 July 1931.

Strays

Elimination of very objectionable interference to a broadcast receiver in the next room was effected by grounding the transmitter negative and inserting a 200-turn r.f. choke in the filament center tap. The key is in the center tap, and no click filter is used. The b.c. receiver can be run full blast without a trace of interference, even when the transmitterinput is as high as 850 watts.

— *W5LB*

FROST-RADIO

No. 20 Series Single Control

No. 20 Series Single Control with A. C. Switch

Why is this new unit completely noiseless?

First, because of the design of the variable contactor used in the new FROST-RADIO No. 20 Series Volume Controls, which makes two separate and distinct *line* contacts, totaling 3/16", with the resistance element. Second, because space between turns has been successfully reduced to one ten-thousandth of an inch, permitting the use of *more* turns and *larger* wire. And third, because contact pressure has been greatly reduced, eliminating cutting and scoring... The No. 20 Series possesses many other advantages. Write us for further details NOW.

CHICAGO TELEPHONE SUPPLY CO.
HERBERT H. FROST, Inc.
Sales Division
***General Offices and Plant:* ELKHART, INDIANA**

SEE PAGE 73

for information you have long wanted to complete your back copy files. . . . Many of these copies will not be available six months from now.

ACT PROMPTLY!

MULTIPLY YOUR METERS at little cost

With I. R. C. Precision Wire Wound Resistors

WW2

I.R.C. engineers have prepared a series of money-saving charts of great value to Servicemen. They show how to build for yourself valuable test equipment, at very little cost, with I.R.C. Wire Wound Resistors.

I.R.C. meter conversion charts enable you to change a voltmeter into a multi-range voltmeter; a milliammeter into a D. C. Voltmeter; a milliammeter into a high range reading milliammeter.

With a kit of 8 I.R.C. Resistors, and the simple instructions we supply, you can actually build a Volt-Ammeter Adapter, which makes *8 different meters from one*, simply by turning a dial.

I.R.C. Service will save you money if you take advantage of it. I.R.C. Resistors have greater dependability, no matter what uses you put them to. *Mail coupon today.*

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☐ Please send meter conversion charts.

☐ Please send instructions on how to build Volt-Ammeter Adapter.

☐ Please send catalog on I.R.C. Resistors.

Name.....

Address.....

City.....State.....

BUY FROM THE OLDEST AND MOST CONSISTENT HAM SUPPLY HOUSE

STROMBERG-CARLSON 250 Watt Power Transformer, gives 1200 volts c.t., 7.5 for 2–281's, 7.5 for 2–250's, 150 volts c.t. and 4 volts. Cat. No. 1011. $ 4.75

THORDARSON new T-3202B 250 Watt Power Transformer, gives 1300 volts c.t., 7.5 volts in two c.t. windings, 2.5 volts at 14 amps. Cat. No. 1001. $ 5.75

Same transformer as above but delivering 200 mils. in secondary. Type T-3865-T. Cat. No. 1000. $ 6.95

THORDARSON T-3321 175 Watt Power Transformer, gives 1150 volts c.t., 7.5 volts in two c.t. windings and 3 volts. Cat. No. 1002. $ 3.25

Same transformer for 25 cycle use. Cat. No. 1043. $ 5.75

THORDARSON Sonora Power Transformer, T-3952, 100 Watts, gives 700 volts c.t., 5 volts for 280 and 2.5 volts for 7 tubes. Cat. No. 1005. $ 2.25

Same transformer for 25 cycle use. Cat. No. 1048. $ 2.75

THORDARSON T-2430A 150 Watt Power Transformer, gives 800 volts c.t. at 350 mils. and 5 volts at 4 amps. Cat. No. 1006. $ 2.75

THORDARSON T-3487 100 Watt Power Transformer, gives 600 volts c.t., 5 volts, c.t. at 2 amps. and 3 volts c.t. at 8 amps. Cat. No. 1046. $ 1.95

Same transformer for 25 cycle use. Cat. No. 1047. $ 2.50

THORDARSON Double Filter Chokes, two windings, each 18 henrys, 250 mils. Cat. No. 1751. $ 4.75

THORDARSON Double Filter Chokes, two windings, each 30 henrys, 125 mils. Cat. No. 1768. $ 1.75

THORDARSON Single Filter Chokes, 30 henrys, 160 mils. Cat. No. 1767. $ 3.50

R.C.A. Double Filter Chokes, two windings, each 30 henrys, 100 mils. Cat. No. 1760. $ .75

CHICAGO TRANSFORMER CO. Filter Choke, 30 henrys, 120 mils. Cat. No. 1753. $ .95

THORDARSON 2.5 Volt Filament Transformer in two windings at 11 and 3 amps. each. Insulation Voltage is 7000. Cat. No. 1267. $ 3.50

HAVE YOU RECEIVED THE AMERICAN FLYER? IT CONTAINS THOUSANDS OF NATIONALLY ADVERTISED AMATEUR ITEMS AT LOWER PRICES THAN EVER QUOTED

BBL Giant Magnetic Unit. Cat. No. 3276. $ 1.50

NEON ½ Watt Bulb. Cat. No. 5060. $ .65

DEFOREST 552, 75 Watt Tube. Cat. No. 5039. $23.00

SOVEREIGN C401, 3 volt tube for Sparton, Cleartone, Day-Fan Receivers, etc. Cat. No. 5077. $ 1.25

DUBILIER 11¼ mfd. Filter Block, 3 mfd. at 1000, 4 at 600 and 4¼ at 160 volts. Cat. No. 2001. $ 1.95

DUBILIER PL 571; 4 mfd. at 600 D.C. Wkg. Voltage. Cat. No. 2006. $ .95

AEROVOX 7 mfd. Filter Block, 2 mfd. at 1000, 2 at 800 and 3 at 400 volts. Cat. No. 2002. $ 1.50

WESTINGHOUSE 1 mfd. 2000 volt Filter Condenser (4000 volt test). Cat. No. 2061. $ 2.75

BROWN & CAINE 9 mfd. Filter Condenser Block, 800 volts, tapped at 1, 1, 1, 1 and 5 mfd. 800 volts. Cat. No. 2069. $ 1.75

Same condenser for 25 cycle use. Cat. No. 2070. $ 3.50

BROWN & CAINE 8 mfd. Filter Condenser Block, 800 volts, tapped at 1, 1, 2, 2 and 2 mfd. 1000 volts. Cat. No. 2067. $ 1.95

Same condenser for 25 cycle use. Cat. No. 2068. $ 3.50

KOLSTER K-5 Dynamic Speaker with 210 power amplifier and "B" supply unit, in console walnut cabinet; uses 2–281's, 1–210. Delivers 500 volts, full-wave pure D.C. for 210 transmitter. Less tubes. Cat. No. 7525. $11.00

R.C.A. UX-867 Photo-Electric Cell. Anode supply: 200 volts at 20 microamperes. Window Diameter 1.25 inches. For UX socket. Cat. No. 5115. $12.50

BAIRD TELEVISION KIT includes Photo-Electric Cell. Complete parts including cabinet and lens. Cat. No. 7774. $73.50

AMATEUR BAND MONITOR completely wired in metal case. Includes coils. Cat. No. 8040. $18.00

AMATEUR BAND DYNATRON OSCILLATOR, wired in metal case. For use on all frequencies. Cat. No. 8039. $29.50

NATIONAL ACSW5 Short Wave Receiver using Variable Mu tubes. 5 tubes in all. Completely A.C. operated. Completely wired. Includes power pack. Less tubes. Cat. No. 7751,3. $73.05

GENUINE R.C.A. WAVE TRAPS UR-1146. Needs no rewiring and is easily installed. Eliminates interference between two or more stations. Cat. No. 8035. $ .75

R.C.A. UNI-RECTRON Power Supply and 210 Amplifier. Delivers 400 volts of D.C. filtered current. Ideal for low power transmitter. If desired 210 can be used as modulator. Less tubes. Cat. No. 7252. $7.50

AMERICAN SALES COMPANY
Q-44 W. 18th St. New York City

closed from ten to sixty seconds after the filaments go on.

A clipping from a Danville, Ill., paper sent in by W9VM says, "O. H. Marsh of Decatur touched a live 33,000-volt power line here and survived. The shock knocked him from the tower on which he was working to the ground ten feet below, but he suffered no broken bones."

Positive proof that O.H.M. has resistance!

HOW TO GRIND CRYSTALS

The following extract from a letter from W4BK to W4BY gives some much-needed information on accurate crystal grinding:

"There is a boy here about sixteen years old who became interested in radio and got a set going, after which he got the crystal bug. He ordered a pound of quartz and I let him have my muck saw to cut it up with. He has cut seven slabs out of the pound so far and got seven good crystals. He did not measure a single one of them while he was grinding and didn't take the trouble to square any of them up. They are all kinds of shapes and work. He had one that would not oscillate and his kid brother, who is five years old, wanted to grind so he gave that one to him. The kid ground about ten minutes on it and brought it back to him, and on trying it again it worked like a top right in the middle of the 80-meter band. Now can you tell one that will beat that?"

No, we can't!

Monitors are useful not only in amateur stations. Here's an extract from a report to the Radio Division from D. D. Beatty of the Forest Service on radio experimental work with portable transmitters in the Columbia Forest:

"The men using the portables were not familiar with radio equipment and only one had learned the code before beginning work. Each was given two or three days' rather sketchy training before going out 'on his own.' . . . They were able to send in orders for supplies and reports of various kinds from the start and in a couple of weeks were sending clearly 6 to 8 words per minute. *I believe the monitor, which enabled them to hear their own signals, had a lot to do with the success in transmitting.*"

We might recommend a monitor for some of the so-called "fists" heard — not copied — in the amateur bands.

The stamp hinges used by philatelists are FB for fastening QSL cards to the wall of the shack. Should a card be removed the hinges will peel off the wall or card without removing any of the paper. They may be purchased at almost any stationery store for as little as ten cents per thousand.

— *W3BLS*

Those slips of ours about "two-mile" condensers and "speed" amplification in the station descriptions in April *QST* certainly got a rise out

DOLLARS
Can be STRETCHED!

New repair prices —

WE211	$10.00
WE212	30.00
211-203A-845	15.00
852-type	15.00
860-type	17.50
250-watt	50.00
849-type	80.00

Water-cooled tubes

228A	100.00
222A	100.00
220B	100.00

Satisfaction guaranteed

Orders shipped C.O.D. — if 10% deposit advanced with order.

Complete catalog ready — some money saving specials for a limited time. Write us now.

Rectobulbs — rugged rectifiers. A type for each service.

R81-750V	$ 7.00
R3-3000V-1A	10.00
R4-3000V-2½A	20.00

National Radio Tube Company
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You can't afford to be without this book

Now in its 2nd edition . . . shows how to service most old and new sets with a tiny stock of CENTRALAB REPLACEMENT UNIT Volume Controls. Send for the book at once.

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CENTRAL RADIO LAB.
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Here is 25c. Send me new VOLUME CONTROL GUIDE

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QST

Write for free booklet

"Opportunities in Radio"

Radio operators are officers aboard ships. Well paid, pleasant work, travel. You can qualify in a short time in our well-equipped school under expert instructors.

Announcing a new course in TELEVISION starting immediately. Full information on request.

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111 West 64th Street, New York *Established 1910*

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AMERICAN RADIO RELAY LEAGUE

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Guaranteed Bargains!

MONEY RETURNED
IF YOU ARE NOT SATISFIED

ROYAL HEAVY DUTY TRANSFORMERS

Powerful and sturdy! Carefully constructed of the best materials. Guaranteed for one year against any defect. Mounted.
2000 and 1500 each side of center-tap. 800 Watts. 28½ lbs. **$13.25**
1500 and 1000 each side of center-tap. 375 Watts. 19 lbs. . . . **$9.65**
1500 CT, 7½ CT, 7½ and 2½ CT. 275 W. 14 lbs. **$6.45**
1200 CT, 7½ CT, 7½ and 2½ CT. 200 W. 11 lbs. **$5.85**
Filament: Completely shielded in metal containers.
2½V-12A — **$2.25**; CT., **$2.75**. 7½V-6A — **$2.75**; CT., **$3.20**.
10V-8A — **$2.95**; CT., **$3.40**. 2½V-4A & 2½V-12A — **$2.75**; CT. **$3.20**. 2½V-10A and 10V-5A — **$4.50**; CT., **$5.25**. 7½ V-3A and 7½V-6A — **$4.15**; CT., **$4.95**.
7½ Volt, 3 Amp. (CT) and 7½ Volt, 3 Amp. (Not CT) . . . **$3.65**
ROYAL 30 Henry, 300 Milliampere Extra Heavy Chokes. 80 Ohms. 18 lbs. — **$8.65**. 15 H, 300 MA. 75 Ohms. 7½ lbs. **$4.15**
ACME Chokes. New Open frame mounting. Very neat. 30 Henry, 200 MA. — **$3.95**. 20 Henry, 300 MA. — **$3.75**
THORDARSON 30 H, 200 MA. Power Chokes. Completely shielded. 250 Ohms. 2000 Volt insulation. 6 Lbs. **$2.70**
SPECIAL 30 H., 200 MA. Chokes. Very rugged. **$2.45**
Double: Each section 30 H., 200 MA. **$4.65**
GENERAL ELECTRIC 5 H, 1000 MA. Heavy Duty Choke in metal case. 5,000 Volt insulation. 25 Ohm. 11 lbs. Three for **$7.25**. Each. **$2.65**
RCA Double. Two 30 H, 125 MA. Chokes in heavy metal case. 1500-Volt insulation. 6 lbs. Special. **$1.85**
Mounted RF Chokes. 85 Millihenry. **35c**

SEPTEMBER SUPER-SPECIALS

One to a customer	*This month only*
POLYMET 8 Mfd. Electrolytic Condensers. New	**60c**
SANGAMO (Illini) .00025 Mica Condensers. Doz. . . .	**60c**
RCA 15 Henry, 50 MA. Power Chokes	**20c**

New low prices on
FLECHTHEIM TRANSMITTING FILTER CONDENSERS

Capacity	DC Working Voltage 1000(HS)	1000(TC)	1500	2000	3000	5000	7000
1 Mfd.	$1.35	$2.02	$2.43	$5.88	$11.76	$17.64	$50.
2 Mfd.	2.43	3.51	4.32	8.82	19.11	32.34	95.
4 Mfd.	3.78	5.94	7.56	14.70	35.28	58.80	175.

CARDWELL CONDENSERS
Receiving (750 Volt): .0001 — **$2.35**. .00025 — **$2.50**. .00035 — **$2.80**. .0005 — **$2.92**. .001 — **$3.53**. Transmitting (3000 Volt): .00022 — **$3.18**. .00044 — **$6.23**. .00033 — **$6.23**. 6000 Volt: .000023 — **$2.55**. .00011 — **$6.23**. 7500 Volt — .0003 — **$47.08**.
All other CARDWELL Condensers at 41% off list.
JEWELL No. 88. 1000 Volts DC (External resistors) — **$14.95**. 2000 Volt **$22.45**. 1000 ohms per volt. All other types at lowest prices.
Pentode output transformers to voice coil. As used on Wright-DeCosta Dynamics. Push-Pull or single. **$1.65**
VICTOR 30 Henry, 125 Mill chokes **$1.25**
ROYAL Porcelain Stand-offs. Black or White, ea. **10c**. Dozen **94c**
CENTRALAB 25,000 or 50,000 ohm Potentiometers. **35c**
No. 12 Heavy Bus-Bar. 18" long. Per Doz. **15c**
TUNGSOL metal-cased Condensers: 2, 2, & 2 Mfd. 1100 Volt wkg. — $2.95. 1 Mfd, 1500 & 2 M–1000 — **$1.95**. 6, 1, 1, 1, & 1 Mfd, 1000 V — **$3.65**.
BRISTOL Double button Mike Transformers. **$1.95**

COMPLETE TRANSMITTERS AND RECEIVERS ALSO IN KIT FORM

SPECIAL Microphone Transformer for double button mikes. Can also be used for single button. Excellent quality **$1.25**
WARD-LEONARD 10,000 ohm 6" long — **65c**. 4" CT — **45c**
HH 50,00 Ohm, 50 Watt Grid Leaks. **70c**
CARTER "Hi-Watt" 10,000 ohm wire-wound Potentiometers. 25 Watt. FB for variable grid leak for Xmitter. **85c**
RCA 5000 Ohm 50 Watt — **39c**. Electrad 50,000 25 W. — **82c**
Highest Quality Tubes. Free 15 Day replacement. UX-281 — **$1.45**. UX-210, 250 — **$1.95**. 280, 245, 171-A, 112-A, 227, 226. . . . . **65c**

Get our low prices on all
Acme, Aerovox, Jewell, Weston, Flechtheim, Thordarson, Signal, Cardwell, Electrad, Akra-Ohm, Vibroplex, etc., etc., parts.

PARCON TRANSMITTING FILTER CONDENSERS
Metal-cased with stand-off insulators. Fully guaranteed!

Working Voltage	1 Mfd.	2 Mfd.	4 Mfd.
1000 Volts DC.	$1.20	$1.85	$3.10
1500 Volts DC.	1.85	3.00	5.60
2000 Volts DC.	2.85	5.25	8.35

First time at these new low prices. *Order Now!*
RCA metal-cased 1 Mfd., 1000-volt Condensers. **65c**
FEDERAL 2 Mfd., 1000 Volt working. Fibre-cased. **$1.10**
DUBILIER .002, 6000 Volt working Mica Condensers. . . . **$1.75**
2 Mfd., 200 Volt metal-cased Condensers. **15c**
Uncased By-pass. .1, .25, .5, or 1 Mfd. **10c**
BRADLEY 500 Watt Radiostat. **$5.38**

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Because of the high cost of handling we cannot accept orders under $2.50. 20% Deposit required. Postage extra.

HARRISON RADIO CO.
189 Franklin Street **Dept. T** **New York City**

of the gang. We have a whole bale of wise cracks stored away in the files.

— - - - —

When using monitor harmonics for checking a transmitter in which doublers are used it is advisable to employ an odd harmonic of the monitor. This eliminates the oscillator and doublers and only the keyed signal is heard.

— *W9BWJ*

— - - - —

W2FP-W2AHI points out that Type '24 tubes with carbonized plates are made that way to eliminate secondary emission. Pick out one with a bright plate for that dynatron frequency meter.

— - - - —

W8QV suggests putting the date of issuance of call letters on QSL cards to keep records in better shape.

— - - - —

Ninth district calls are getting out of hand these days. W9COW worked W9HEN recently and told him he had a "chicky" call, and added that his was no "bull," either. They're thinking of starting a barnyard club.

— - - - —

O. H. Mills, whose high-resistance initials were mentioned in May *QST*, writes that in spite of his high resistance he also has "mills." HI. He no longer has the call W8DMA, however, but it is now pounding brass on WFOO.

The S. F. Transmitter at W1XV

(*Continued from page 33*)

help to answer many of the questions that are being asked regularly by amateurs and observers who use the standard frequency signals; and that it will dispel such ideas as the common one that a large number of accurately calibrated quartz crystals are used to control the transmitter!

The Frequency Measuring Test

(*Continued from page 38*)

Official Transmitting Stations will be sent to all who ask for them. It is suggested that amateurs in foreign countries send in their requests for test material as soon as possible, particularly those who will not receive October *QST* before the tests.

WWV 5000-KC. TRANSMISSIONS

The Bureau of Standards Station WWV will transmit calibration signals on 5000 kilocycles, accurate to within one part in a million, between 2:00 and 4:00 p.m. and between 10:00 p.m. and 12:00 midnight, E.S.T., on the following Tuesdays: Sept. 8th, 15th, 22nd, 29th; and between 2:00 and 4:00 p.m. and between 8:00 and 10:00 p.m., E.S.T., on the following Tuesdays: Oct. 6th, 13th, 20th, 27th. Reports on the reception of these signals should be sent to the Bureau of Standards, Washington, D. C., or via A.R.R.L. Headquarters.

— *F. E. H. and J. J. L.*